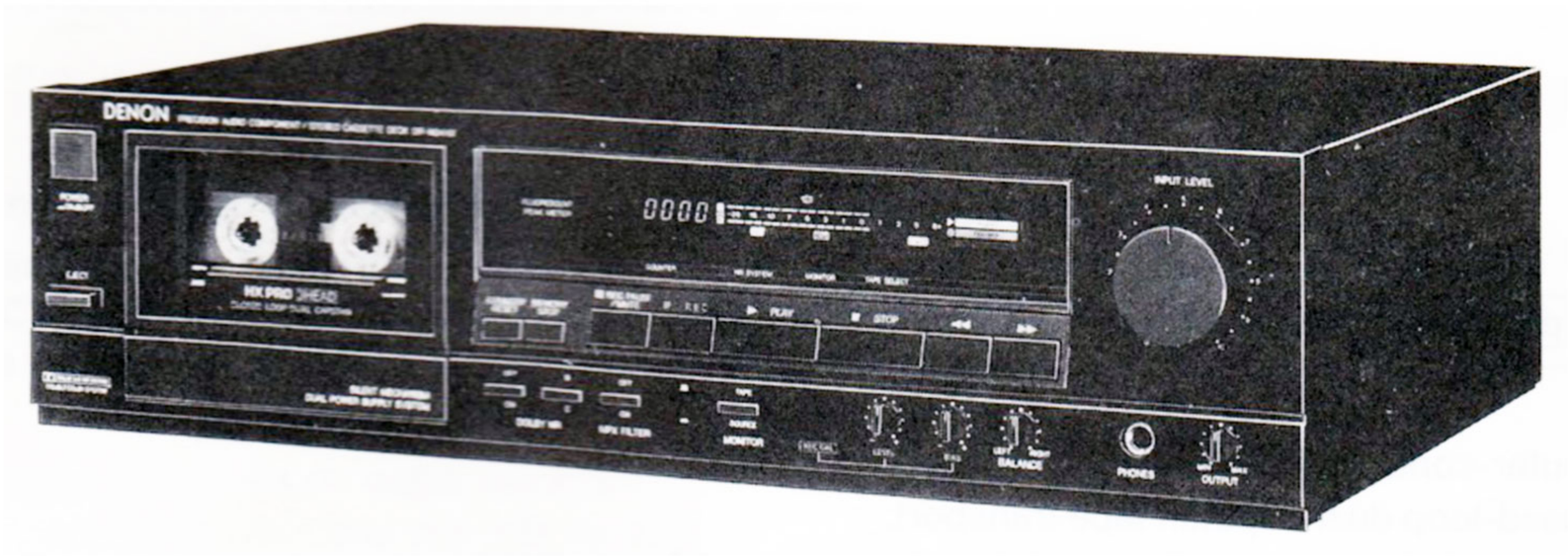
DENON

SERVICE MANUAL

STEREO CASSETTE TAPE DECK

MODEL DR-M24HX



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FEATURES

- ■ Computer-controlled servo technology.
  - ● Closed-loop dual-capstan tape transport.
  - ● Silent, soft-touch controls provide maximum ease-of-use.
  - ● Computer-controlled, full-logic tape controls enable fool-proof operation.
  - ● Automatic eliminating the slack of the tape.
- ■ Three-head design utilizes the SF record/playback combination head assembly.
- ■ Dolby HX PRO headroom extension.
- ■ Dolby-C noise reduction systems (Double Dolby System).
- ■ Computing tape counter with 4-digit readout and memory stop.
- ■ Large fluorescent display panel.
- ■ Auto tape selector.
- ■ Recording Bias adjustment control.
- ■ Recording Calibration control.

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SPECIFICATIONS

- Type ..... Vertical tape loading 4-track 2-channel stereo cassette tape deck
- Heads ..... Record/Playback (SF R/P head)
  Erase (ferrite head)
- Motors ..... Capstan (DC servo motor) ×1
  Reel (DC motor) ×1
  Actuator (DC motor) ×1
- Tape Speed ..... 4.8 cm/sec.
- Fast forward, rewind time ..... Approx. 90 sec. with a C-60 cassette
- Recording bias ..... Approx. 105 kHz
- Overall S/N ratio ..... Dolby C NR on . . . more than 75 dB (CCIR/ARM)
  (at 3% THD level)
- Overall frequency response ..... 25 ~20,000 Hz ±3 dB (at —20 dB METAL tape)
- Channel separation ..... more than 40 dB (at 1 kHz)
- Crosstalk ..... more than 65 dB (at 1 kHz)
- Wow & flutter ..... 0.045% wrms, ±0.1% w. peak
- Inputs
  line ..... 80 mV (—20 dBm) input level at maximum
  Input impedance: 50 kohm unbalanced
- Outputs
  line ..... 775 mV (0 dB) output level at maximum (with 47 kohm load, recorded level of 200 pwb/mm)
  headphone ..... 1.2 mW output level at maximum (optimum load impedance 8 ohm ~1.2 kohm)
- Accessories ..... Parallel pin cord ×2
- Power supply ..... 50 Hz/60 Hz compatible, voltage is shown on rating label
- Power consumption ..... 18 W
- Dimensions ..... 434 (W) ×115 (H) ×286 (D) mm
- Weight ..... 5.6 kg

■ Above specifications and design styling are subject to change for improvement.

■ Dolby noise reduction and HX PRO headroom extension manufactured under license from Dolby Laboratories Licensing Corporation. HX PRO originated by Bang and Olufsen. "Dolby", the double-D symbol and "HX PRO" are trademarks of Dolby Laboratories Licensing Corporation.

WARNING:

1. Component parts

Parts marked with ⚠ and/or shading in this service manual have special characteristics important to safety. Be sure to use the specified parts for replacement.

2. Leakage current

Before returning the appliance to customer, test the leakage current when the power plug is connected. Use a calibrated (with an error of not more than 5%) leakage current tester and measure the leakage current from any exposed metal to the earth ground. Reverse the power plug polarity and test the above again.
Any current measured MUST NOT EXCEED 0.5 milliamps. Corrective measure must be taken if it exceeds the limit.

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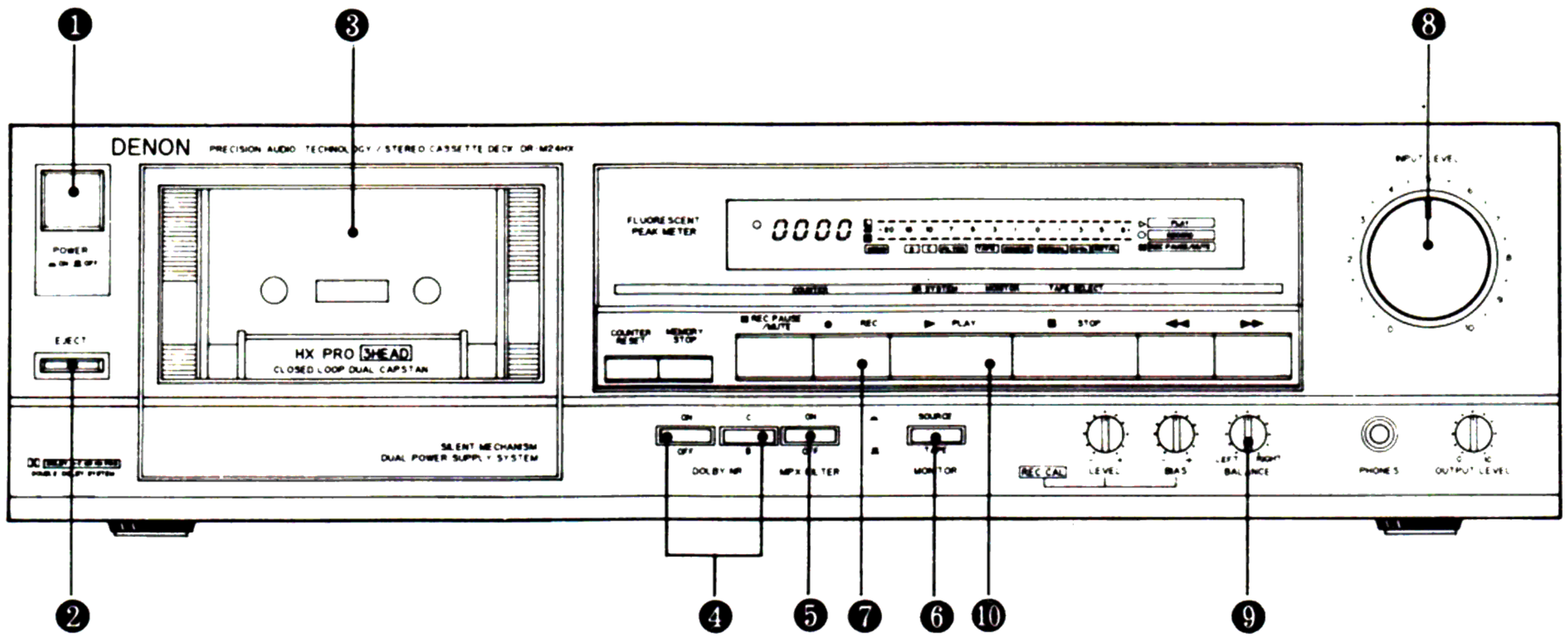
PART NAMES AND FUNCTIONS



1. POWER switch

Controls the supply of AC power to the deck. One push turns the deck on, a second push turns it off. The deck remains in a stand-by (non-operative) mode for approximately 4 seconds after it is switched on.

2. EJECT button

Press this button to eject the cassette. When the deck is operating (tape is running), press the stop (■) key first to stop the tape transport; then press the EJECT button.

3. COUNTER RESET button

Operation of the button resets the counter to all zero.

4. MEMORY STOP button

During rewinding operations, the tape will stop at the "0000" counter point automatically when this button is pressed in.

5. DOLBY NR switches

The left Dolby NR switch activates (in) or deactivates (out) the deck's Dolby noise reduction circuitry. The right switch selects either Dolby B-Type (out) or C-type NR (in).

6. MPX FILTER switch

The MPX FILTER switch should be used to prevent interference with the Dolby NR circuit when making Dolby NR encoded recordings of FM stereo programs. When making Dolby NR encoded recordings from any program source other than FM stereo, leave this switch in the "OFF" (out) position.

7. MONITOR switch

The SOURCE (in) position of this switch allows you to monitor the source program before it is recorded. The TAPE (out) position of this switch is used for tape playback monitoring or simultaneous monitoring during recording.

8. LEVEL control

This is the level adjustment knob which corrects the recording sensitivity characteristics of various types of tapes.

9. BIAS control

(for NORMAL CrO_2 and METAL tape)

Adjust the bias according to the tape characteristics. Standard biasing is obtained at the center click-stop position.

10. BALANCE control

This is the knob to adjust the recording level balance between the left and right channels. Turn it counterclockwise to reduce the right channel's level and clockwise to reduce the left channel's. Usually, put the knob at the center click position.

11. PHONES jack

For private music enjoyment without disturbing others, or for monitoring a recording, a set of headphones may be plugged in. Impedance should be from 8 to 1200 ohms.

12. OUTPUT LEVEL control

This control adjusts playback, recording monitor, and headphones output levels for the both channels simultaneously.

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13. INPUT LEVEL control
The recording input level is adjusted by this knob. The levels in the left and right channels can be changed simultaneously.

14. Cassette compartment cover
If this compartment cover is not closed completely, the deck's transport controls will remain inoperative.

15. TAPE COUNTER
These meters indicate recording or playback peak levels for each channel.

16. FLUORESCENT PEAK METERS
When the memory switch is turned on, the letters of "MEMO" will be displayed.

17. MEMORY indicator
This indicator light is interlocked with the memory switch.

18. NR SYSTEM indicator
This indicator light is interlocked with the Dolby NR switch and informs the user that Dolby NR is in use as well as which (B or C) Type.

19. FILTER indicator
This indicator light is interlocked with the MPX FILTER switch. (FILTER)

20. MONITOR indicator
This indicator light is interlocked with the MONITOR switch to inform the use of the selected monitoring source – TAPE or SOURCE.

21. TAPE SELECT indicator
This indicator light is interlocked with the Auto Tape Select feature which automatically adjusts the deck to the type of tape in use. (NORMAL, CrO_2 or METAL).

22. Tape transport controls

▶ PLAY	PLAY KEY	Press to playback tape.
■ STOP	STOP KEY	Press to stop tape in any mode.
◀◀	REW KEY	Press for fast rewind.
▶▶	FF KEY	Press for fast forward tape winding.
● REC	RECORD KEY	To begin recording, press the RECORD and PLAY keys simultaneously. If only the RECORD key is pressed, the deck is placed in the REC PAUSE (record standby) mode.
▮▮ REC PAUSE/MUTE	REC PAUSE/MUTE KEY	Press this key for less than 0.5 sec if you want to change from the recording state into the pause state. When this key is pressed for more than 1 sec for making a non-recorded part between two melodies, about 5 sec of non-recorded part can automatically be created.

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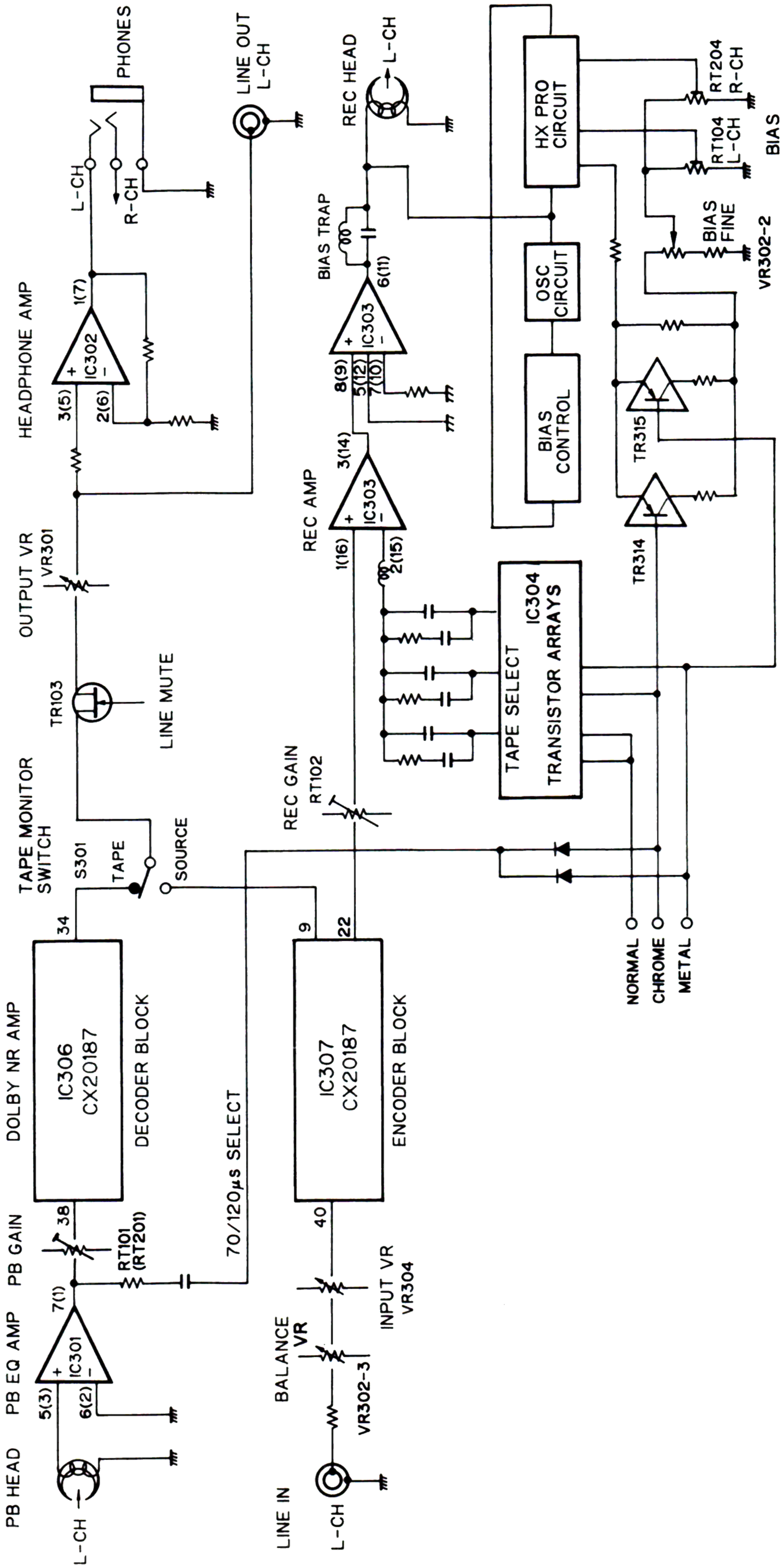
BLOCK DIAGRAM



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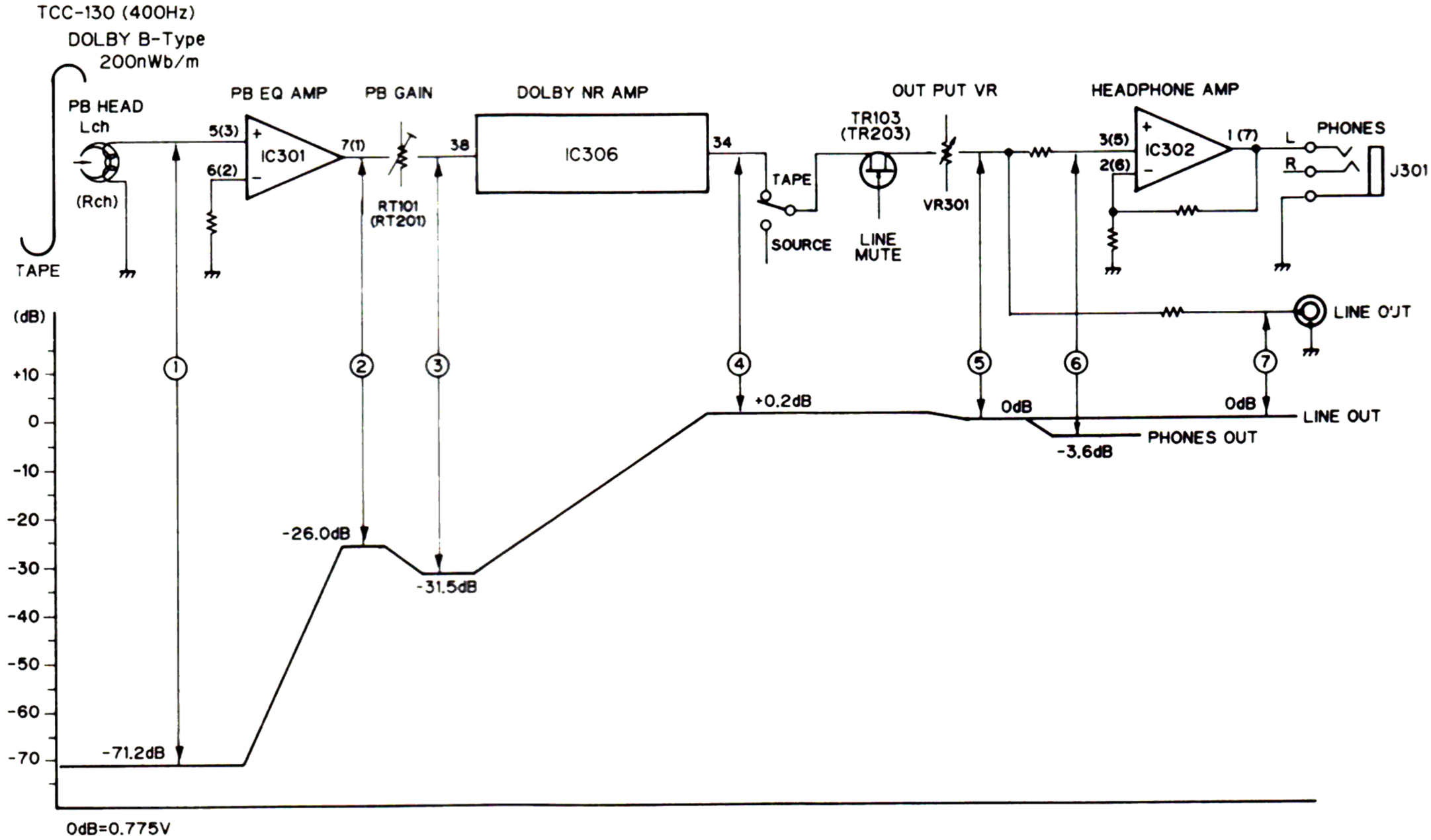
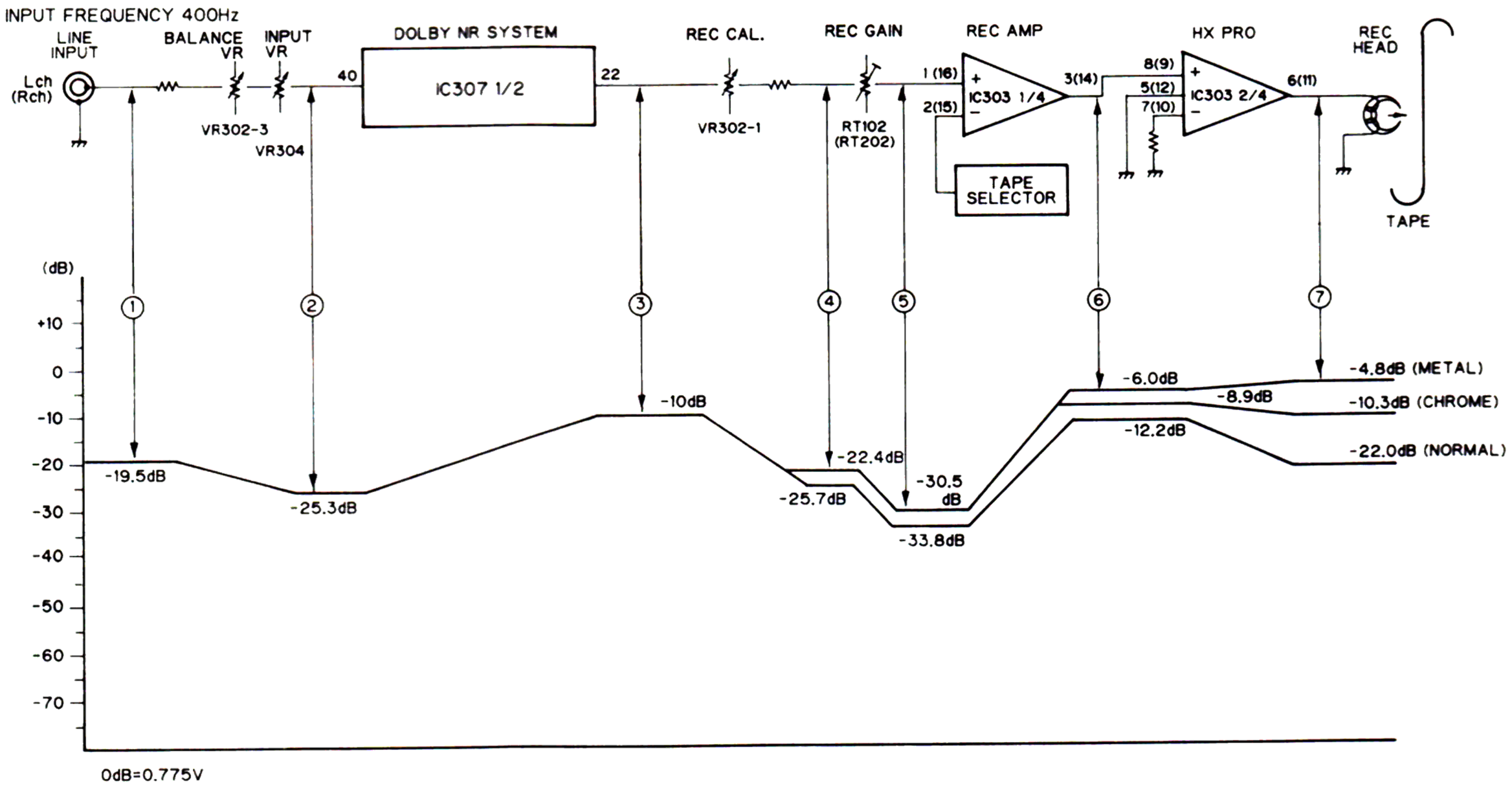
LEVEL DIAGRAM

PLAYBACK SYSTEM



RECORDING SYSTEM



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DISASSEMBLY INSTRUCTIONS

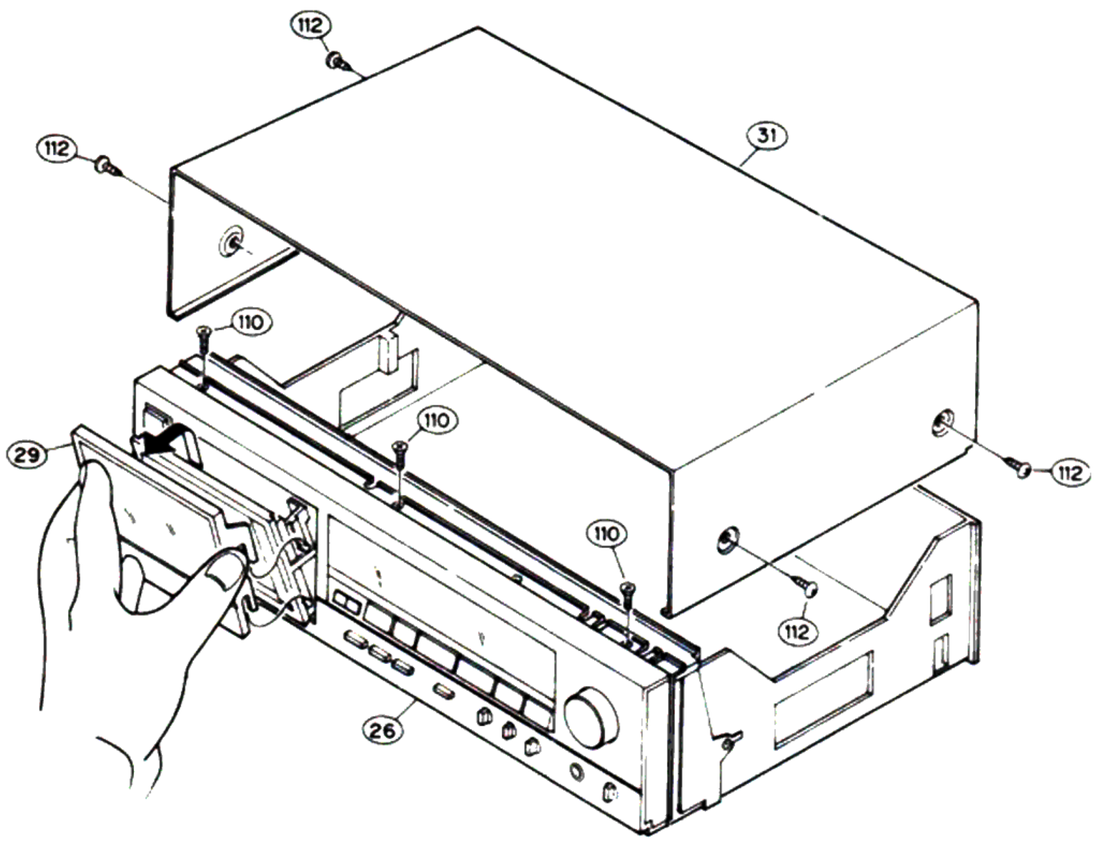
1. How to Remove the Front Panel

(1) Unscrew the 4 screws 112 from both sides of the top cover 31 and take off the top cover by pulling it up.

(2) Press the eject knob 23, open the cassette window 29 and take off the mechanism, as shown in the diagram.

Note: Be careful when handling the cassette window, as it is easily scratched.

(3) The front panel can be removed by unscrewing the 3 upper screws (3x8 CFTS (S)-Z) 110 from the front panel 26 and loosening the 4 hooks.



2. How to Remove the Mechanisms

(1) Remove the top cover 31 and the front panel 26.
(Refer to section 1)

(2) Unscrew the 2 screws (3x10 CBTS (P)-Z) 104 holding the angle 14 and the mechanism 12 and the 2 chassis holding screws 106 and remove the angle.

(3) Unscrew the 2 mechanism holding screws 102 (3x8 CBTS (P)-Z).

(4) Remove the connectors with lead wires, which runs from the mechanism section, from the audio circuit board.

3P connector CN5
6P connector CN2
8P connector CN1

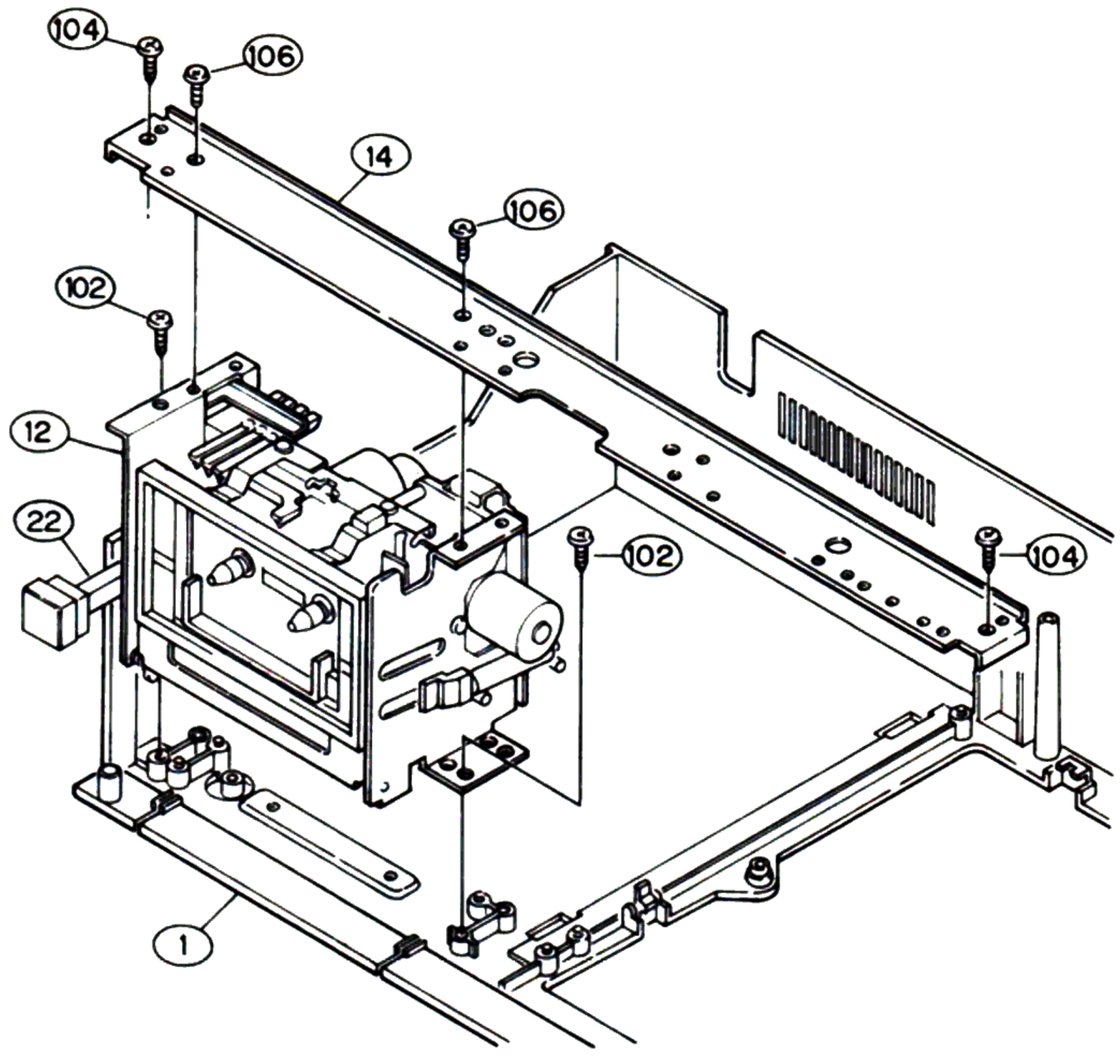
Note: When assembling, check to make sure the connectors are inserted correctly.

(5) Pull out the power switch level 22 from the power switch 58.

(6) Remove the eject knob 23.

(7) The mechanism can be removed by holding the mechanism and pulling up.

Note: When assembling, do so after checking to make sure the 2 stay holes on the lower side of the mechanism unit are matched with the chassis protrusions.

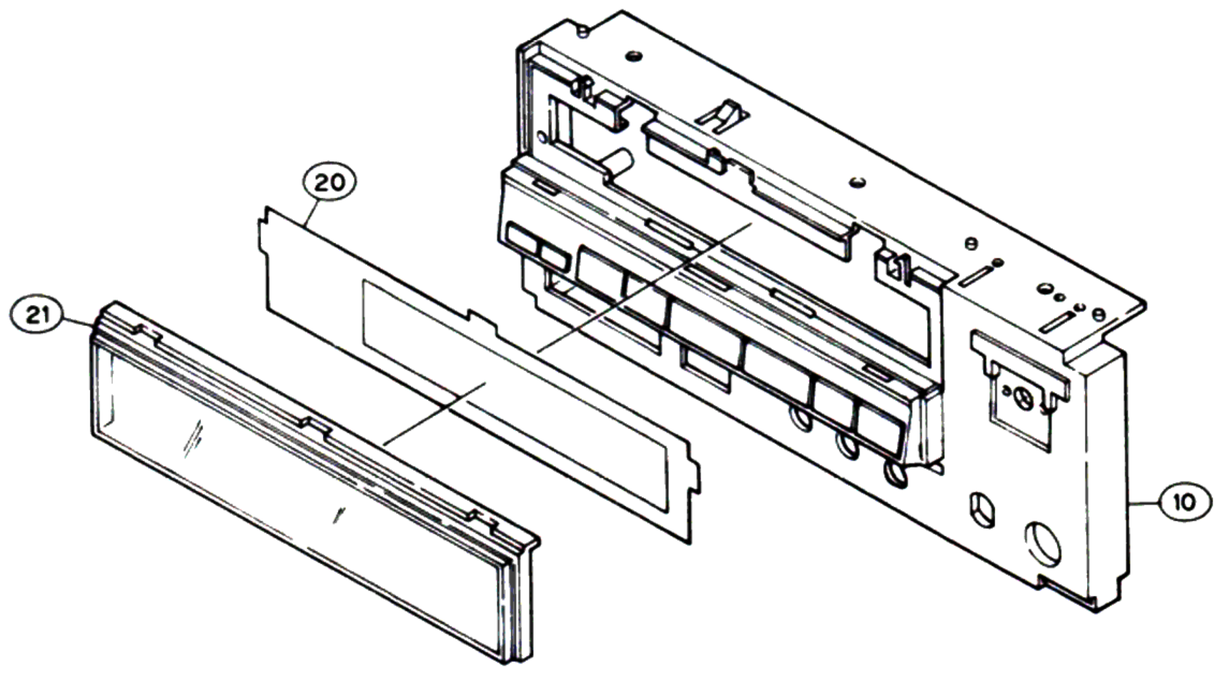


3. How to Remove the Meter Window and the Color Filter

(1) Remove top cover 31 and front panel 26.
(Refer to Section 1)

(2) Meter window 21 can be removed by pulling up.

(3) Color filter 20 can be removed after meter window 21 is removed.



4. How to Remove the Input Volume Circuit Board

(1) Remove the top cover 31 and the front panel 26.
(Refer to section 1)

(2) Remove the volume knob (A) 27.

(3) By unscrewing the nut holding the input volume 57, the input volume circuit board can be removed.

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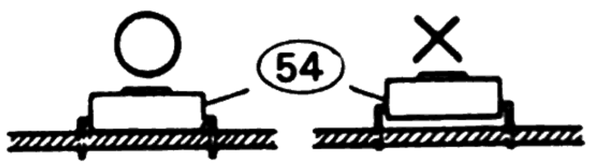
5. How to Remove the Front Esc Ass'y

(1) Remove the top cover 31 and the front panel 26. (Refer to section 1)
(2) Remove the angle 14. (Refer to section 2)
(3) Remove the meter window 21 and the color filter 20. (Refer to section 3)
(4) Remove the input volume circuit board. (Refer to section 4)
(5) Unscrew the nut holding the headphone jack 52. Then the front esc ass'y 10 can be removed.

6. How to Remove the Meter Circuit Board

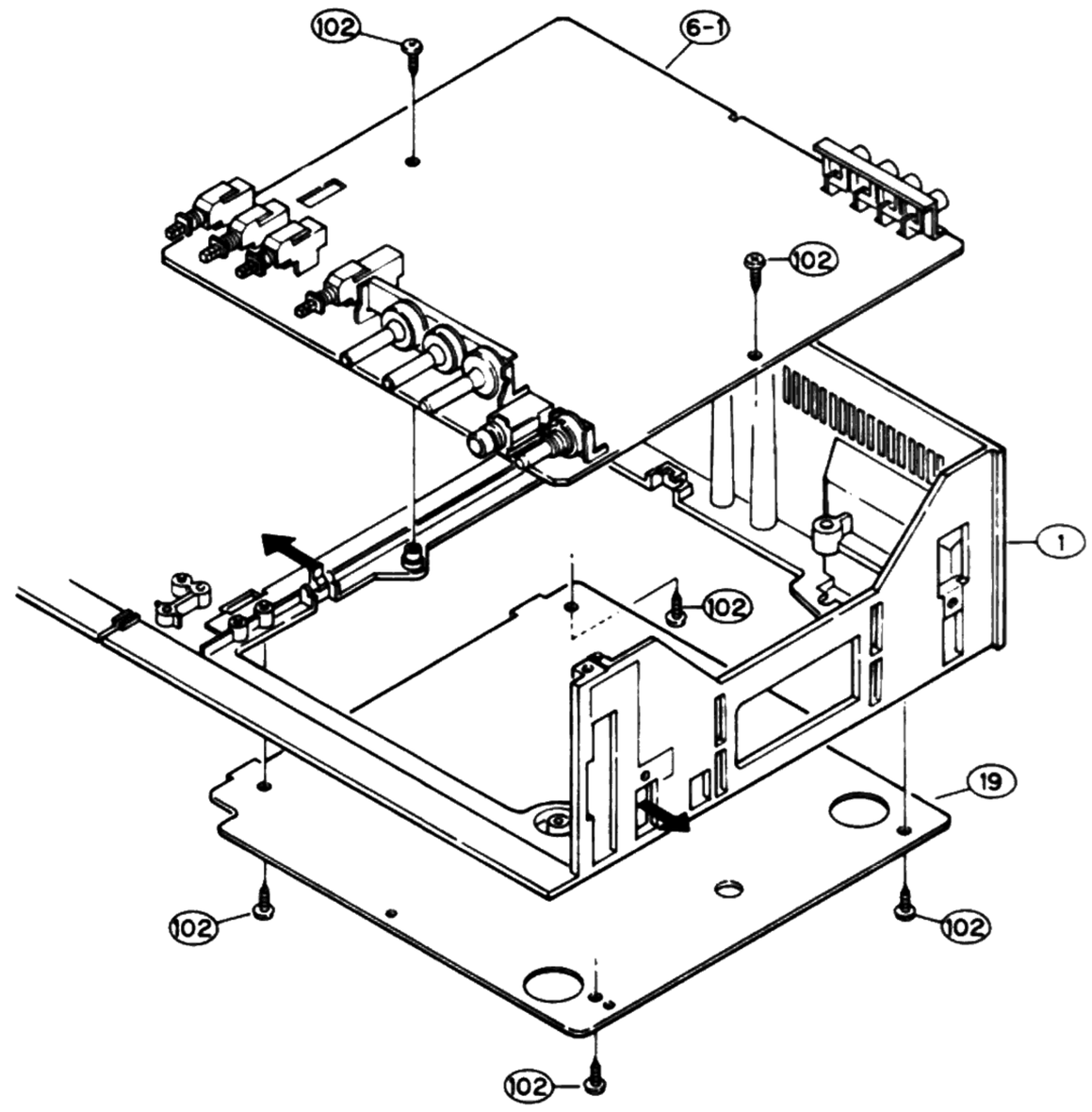
(1) Remove the top cover 31 and the front panel 26. (Refer to Section 1)
(2) Remove the angle 14. (Refer to section 2)
(3) Remove the meter window 21 and the color filter 20. (Refer to section 3)
(4) Remove the front escuchion ass'y 10. (Refer to section 5)
(5) By loosening the 4 hooks on the front escuchion ass'y 10 holding the meter circuit board 6-2, it can be removed.

Note: When replacing the tact switch 54, always check to make sure that it is not floating above the circuit board. If it is floating, the switch will be in the on condition when the set is assembled.



7. How to Remove the Audio Circuit Board

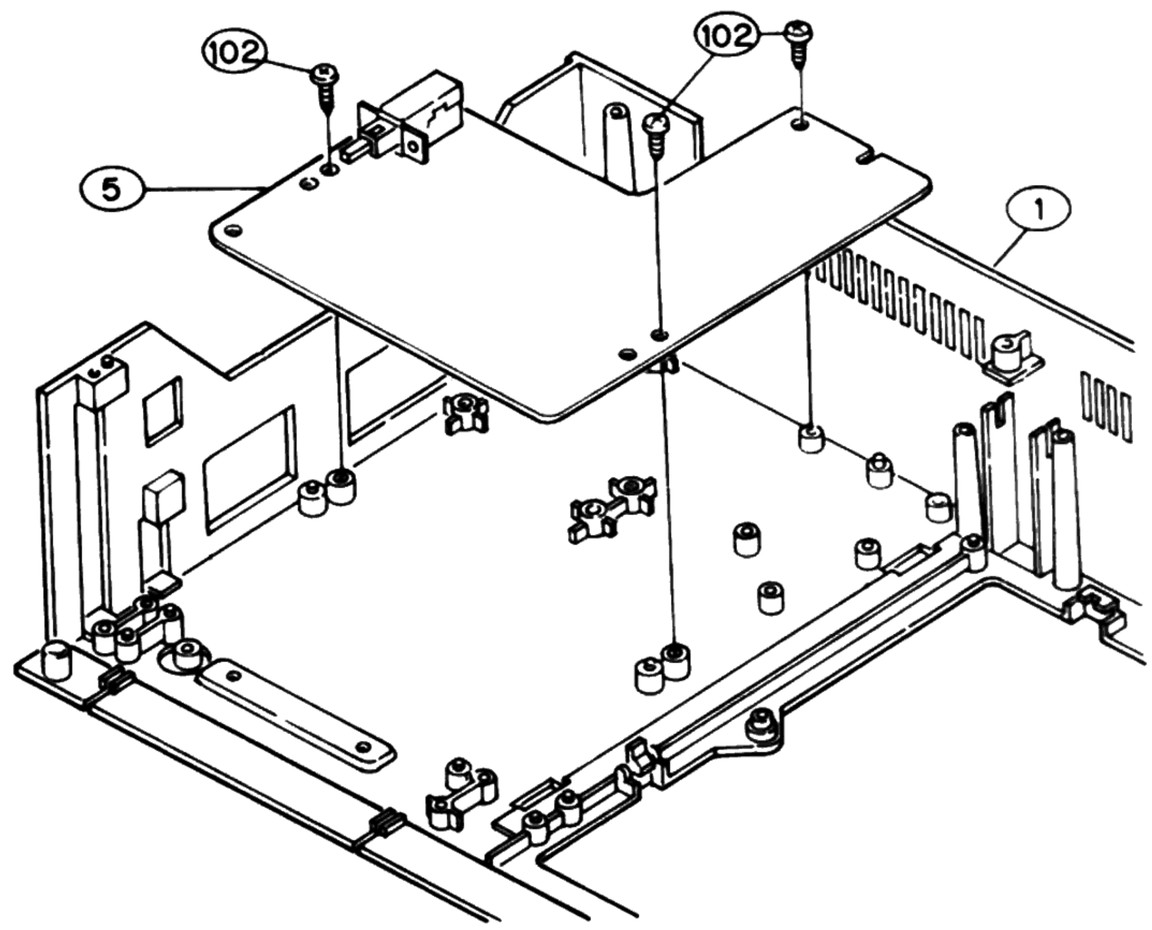
(1) Remove the top cover 31 and the front panel 26. (Refer to section 1)
(2) Remove the angle 14. (Refer to section 2)
(3) Remove the front escuchion 10.
(4) Remove the meter circuit board 6-2. (Refer to section 6)
(5) Remove the connectors from the audio circuit board 6-1.
(6) Unscrew the 4 bottom cover holding screws (3x8 CBTS (P)-Z) 102 on the back side of the chassis 1 and remove the bottom cover 19.
(7) By loosening the 2 hooks on the chassis holding the audio circuit board 6-1, the audio circuit board can be removed.



Note: Most repairs to the audio circuit board can be performed by removing the bottom cover on the chassis. Refer to the above procedure only when necessary.
When reassembling, follow the procedures in reverse order; however, if each of the various parts are not assembled properly in their respective position, the set cannot be assembled. When assembling, check the work of each step carefully.

8. How to Remove the Power Supply Circuit Board

(1) Remove the top cover 31. (Refer to section 1)
(2) Remove the various connectors from the power supply circuit board 5.
(3) Unscrew the 3 screws (3x8 CBTS (P)-Z) 102 holding the power supply circuit board.
(4) By pulling up the power supply circuit board 5, it can be removed.



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ADJUSTING AND CHECKING THE MECHANISM SECTION

1. Replacing the Pinch Roller.

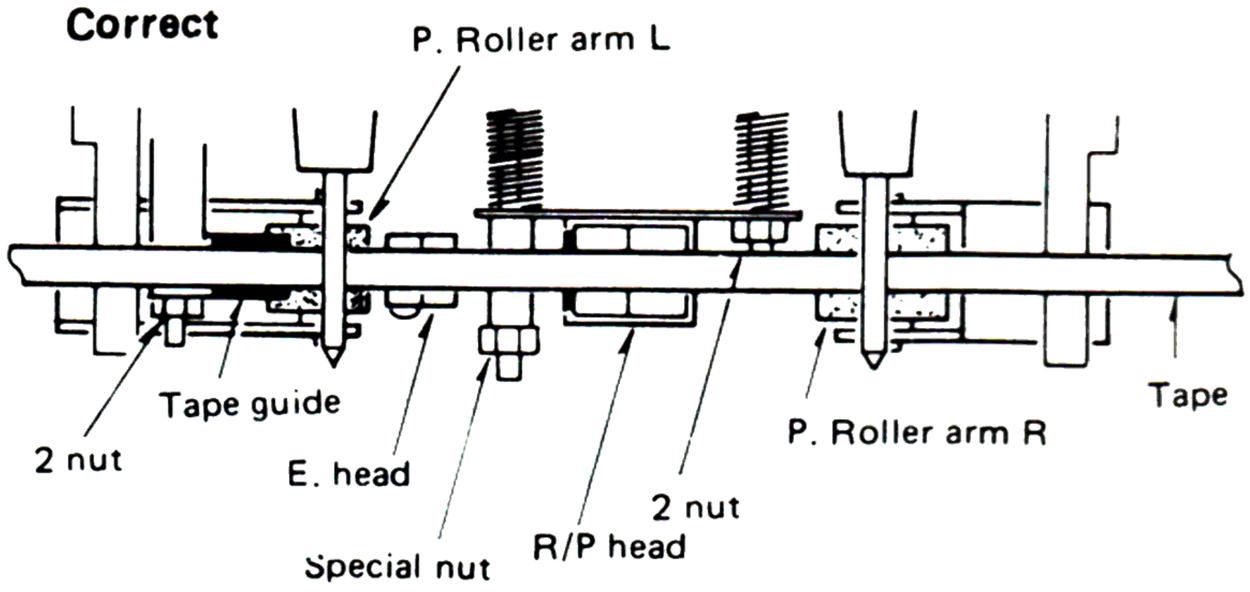
Before replacing the pinch roller, clean the tape contact surface of the pinch roller and the capstan shaft.

Most causes of poor tape transport can be traced to dirty pinch rollers and capstan shafts.

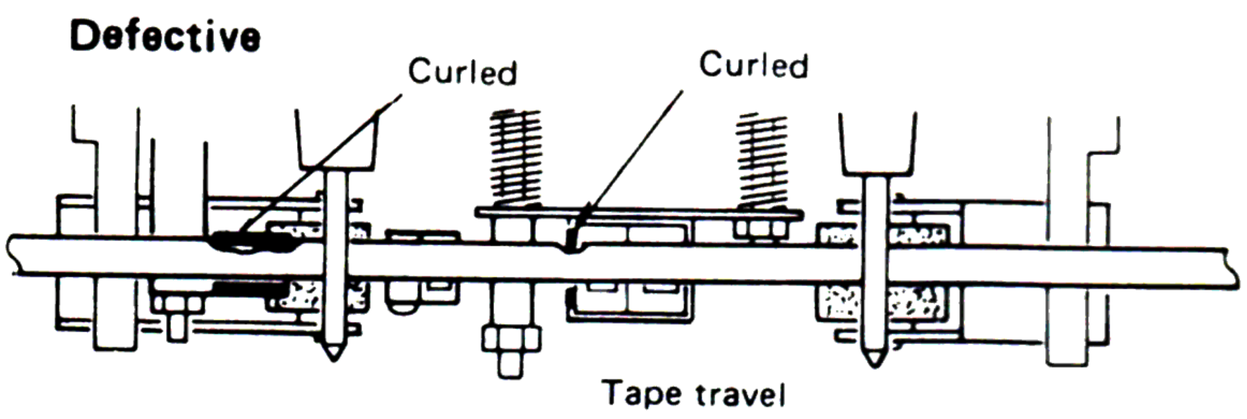
The right side pinch roller 23 can be taken out by removing spring 24 and slit washer 317. In the same manner, the left side pinch roller 104 can be taken out by removing spring 106 and slit washer 317. After replacing, play a padless C-90 tape and check for tape curls at the head tape guide section.

In addition, in the playback mode, check to make sure that the right side pinch roller contacts the capstan shaft before the left side pinch roller contacting.

Correct



Defective

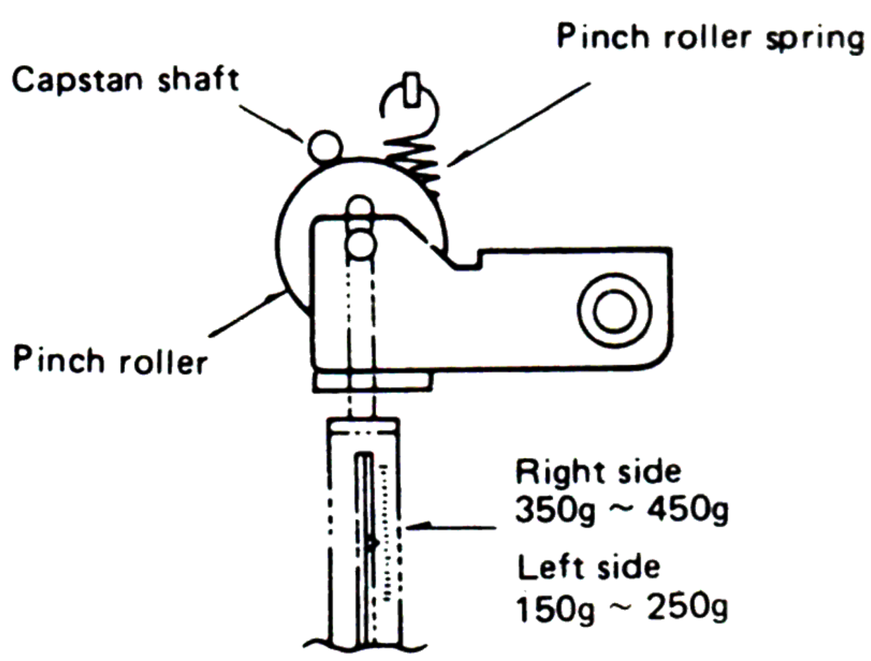


Tape travel

2. Checking the Pressure Force of the Pinch Roller

In the playback mode, hook a spring weight onto the bracket at the center of the pinch roller. After separating the pinch roller from the capstan shaft, allow the pinch roller to contact the capstan shaft again. When the pinch roller starts to rotate, check to make sure the rod type spring weight reading is 350g—450g for the right side and 150g ~ 250g for the left side.

If it is not within the normal range, replace the pinch roller spring 24 or 106.



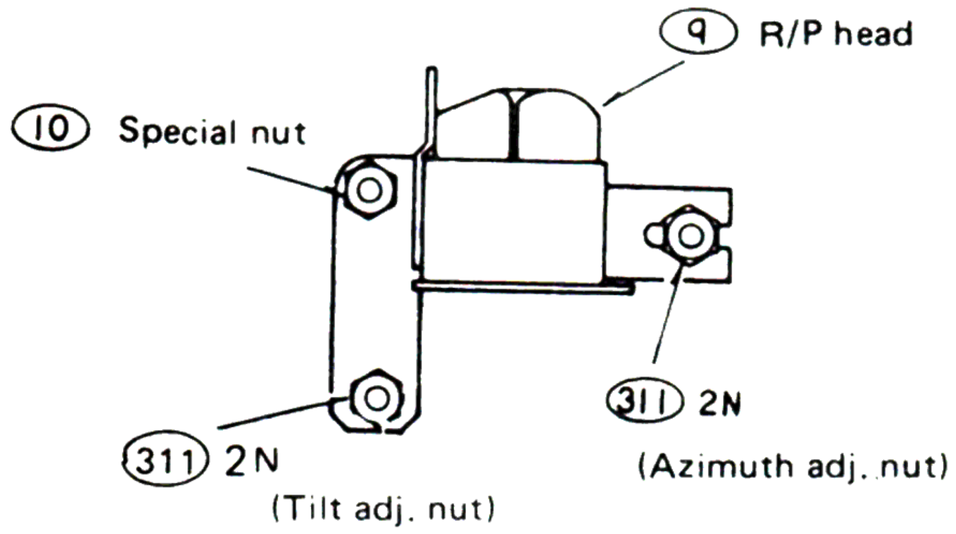
3. Replacing the Record/Playback Head

* Before replacing, remove the front panel 233.

(1) How to remove the R/P HEAD.

1) Next, Take out the azimuth adjustment NUT 311, tilt adjustment NUT 311, and the height adjustment Special nut 10 loosening them alternately.
If they are not loosened alternately, the R/P HEAD base may become warped.

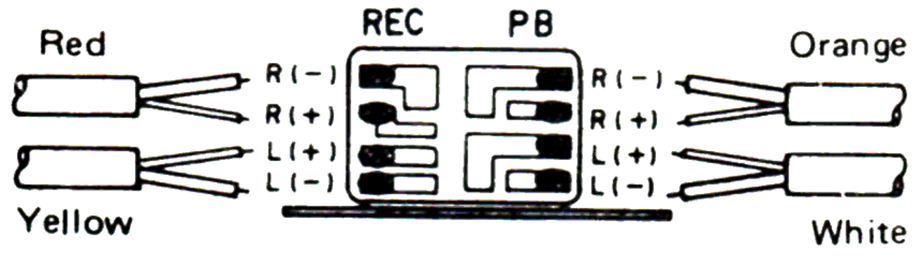
2) By unsoldering the HEAD WIRES on the circuit board section of the R/P HEAD, the entire R/P HEAD can be taken off the mechanism unit.



(2) How to assemble the R/P HEAD.

Reverse the above (1) procedures for removing the R/P HEAD.

* Solder the HEAD WIRES according to the diagram above.



4. Adjusting the R/P HEAD

(1) Height adjustments (Use the head adjusting jig THG-801

1) Set the THG-801 tool plate on the mechanism unit; turn the height adjustment Special nut 10 and adjust so that the 3.8 mm measure section of the THG-801 (tool grip) can pass without contacting the tape guide of the R/P HEAD 9.

2) When adjusting the height, make sure the R/P HEAD is not tilted by turning the azimuth adjustment nut 311 nut, and checking with your eyes.

* Never allow the THG-801 (tool grip) to hit the tape contact surface of the R/P HEAD strongly. It may scratch the surface.

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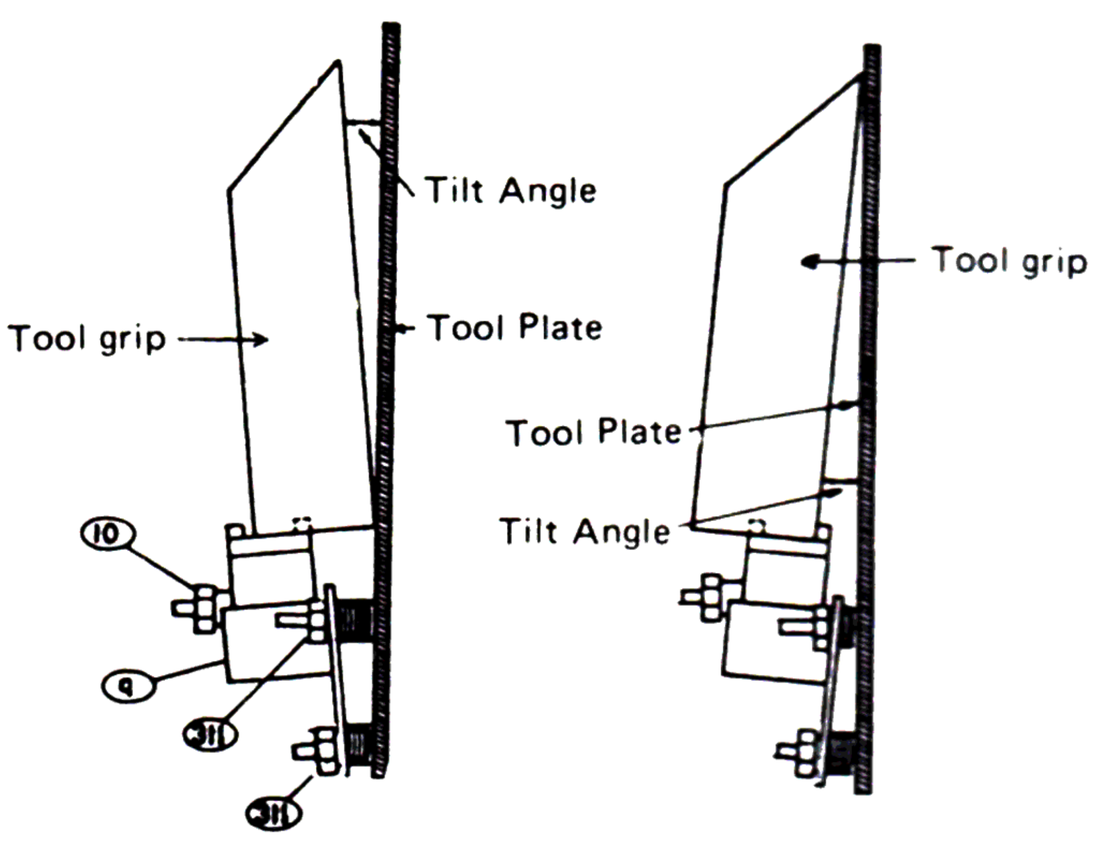
(2) Adjusting Tilt Angle

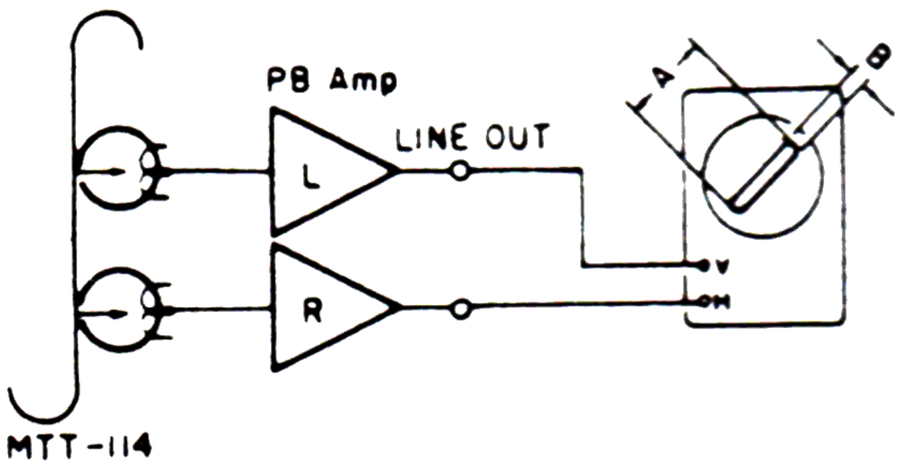
1) Set the THG-801 Tool Plate on the Mechanism Unit and then place the THG-801 Tool Grip on the R/P Head, and check the Tilt Angle between THG-801 Tool Plate and THG-801 Tool Grip. If the THG-801 Tool Grip is tilting toward the front, loosen Tilt with nut (311). If the THG-801 (Tool Grip) is tilting toward the rear, tighten it. Adjust the Tilt Adjustment nut (311) until the THG-801 Tool Grip becomes parallel with the THG-801 Tool Plate.

2) If the Tilt Angle is adjusted more than once, height Adjustment may slip. Always make sure to check height adjustment. If height has slipped, adjust it again. After adjustment, fix screw.

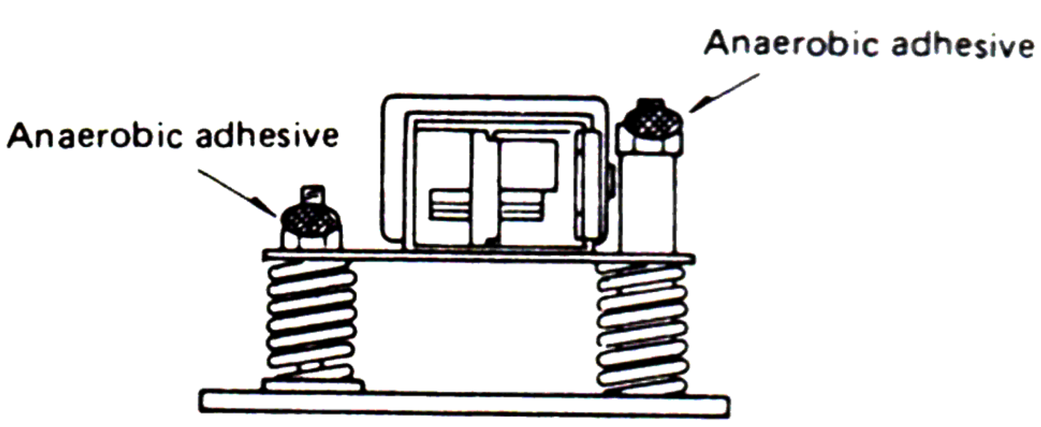


(3) Azimuth adjustments

Play back the A·BEX TCC-153 test tape. Turn the azimuth adjustment nut and adjust so that A of the resurge wave form is maximum and B is minimum. After the azimuth adjustments, re-check the head height with the THG-801 to make sure the height has not deviated.



* After the adjustments, apply anaerobic adhesive on the positions indicated in the diagram.



5. Adjustment and Replacement of Erasing Head

(1) Height Adjustments

Set the THG-801 Tool Plate on the mechanism unit. Using a surface measure of 3.8 mm from the THG-801 Tool Grip, turn adjustment nut (311) and (171) and adjust the height of Erasing Head's center to coincide with the center of the THG-801 Tool Grip. After adjustment, place the THG-801 Tool Grip on the Erasing Head, check to see that the THG-801 Tool Plate and the THG-801 Tool Grip are parallel, and that the Tilt Angle has not changed. Lock after adjustment.

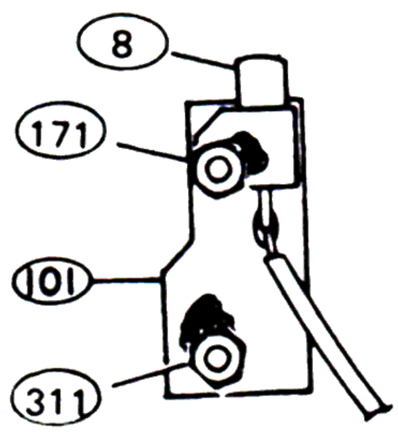
(2) Tilt Angle Adjustment

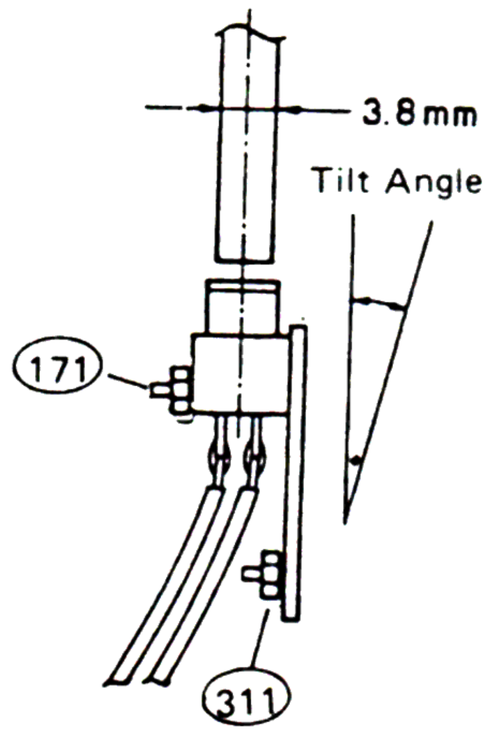
Set the THG-801 Tool Plate on the mechanism unit. Place the THG-801 Tool Grip on the Erasing Head, and check the gap between the THG-801 Tool Plate and the Tool Grip. If the THG-801 Tool Grip is tilting toward the front, loosen the Tilt adjustment nut (311). If it is tilting toward the rear, tighten it and adjust the Tilt adjustment nut (311) until the THG-801 Tool Grip becomes parallel with the THG-801 Tool Plate.

CAUTION: After adjusting the Tilt Angle, height adjustment may sometimes be warped. Recheck height adjustment. If it is warped, readjust the height. After adjusting, fix nuts (311) and (171).

(3) Erasing Head Replacement

Erase Head may be replaced after removing nuts (311) and (171) which affix it to the deck mechanism. After replacement, adjust the height and the Tilt angle.





6. Height Adjustment of the Tape Guide

Set the THG-801 jig plate onto the mechanism unit and adjust the height by rotating the height adjustment nut 311 so that the 3.8mm section of the THG-801 jig can pass through without contacting the tape guide section of tape guide 103.

7. Checking the Take-up Torque

Load the cassette type torque meter. Check to make sure that the torque meter average reading is within 30～80 g-cm during playback. If it is not within this range, check the voltage (3.3 V±0.3 V) of the reel motor. If the voltage is low, the torque will be weak; if it is high, the torque will be strong. In addition, check for reel thrust movement in section 8.

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8. Checking the FF and REW Torques

* When using the cassette type torque meter.
  Check to make sure the torque meter indicates more than 80 ~ 160 g-cm at the end of FF and REW.
* When using a modified cassette half.
  Load the modified cassette half; hook the end of the dial tension meter (full scale 100–300 g) onto the triangle section. In the FF (REW) mode, feed the tape in at a rate somewhat slower than the take up speed. Check to make sure the dial tension meter reads more than 80 g-cm.

9. Checking the Back Tension Torque During Record/Playback

Load the cassette type torque meter; check to make sure the torque meter reads between 5 ~ 13 g-cm during playback and that there is no unevenness.
If it is not within this range, check the section on adjusting the reel trust movement; or replace the spring 109.

10. Checking the FF and REW Times

Load a C-60 cassette tape; check to make sure the tape is fast forwarded or rewound within 70–110 seconds. If it is not within this range, check sections 8 and 10.

11. Checking the Operation of the Erase Prevention, Metal and Chrome Switch Operation Arms

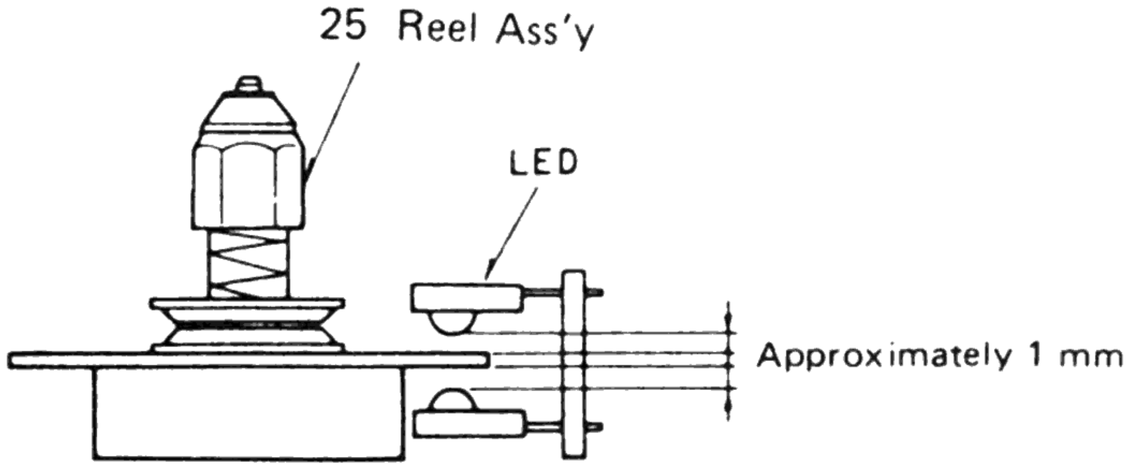
Check to make sure the operation arms 58, 59 operate the switches positively, depending on whether or not there are holes.

12. Checking the EJECT Switch

To check the operation of the EJECT SW with only the mechanism unit, make sure the angle 205 operates the switch positively when the hook lever 203 is operated.

13. Checking the Gap Between the Pulse Detection LED and the Reel Ass'y

Check to make sure the gap between the surface of the shutter section of the reel ass'y and the LEDs is approximately 1 mm.



ADJUSTING THE ELECTRICAL SECTIONS

- **Measuring instruments necessary for adjustments**

(1) Audio signal generator
(2) Variable resistance attenuator
(3) Electronic voltmeter
(4) Oscilloscope
(5) Frequency counter
(6) Adjustment screwdriver
(7) Trap coil adjustment square stick
(8) Test tapes (SONY TY-224, A-BEX TCC-153, TCC-130
(A-BEX TCC-262)
(DENON RD, HD-X, MD)
(9) Transport Check cassette tape
(A-BEX TCC-902) Mirror tape

- **Cautions on adjusting**

(1) Before adjusting, clean the head surface, capstan and the pinch roller with a gauze or a cotton swab moistened with alcohol.
(2) Demagnetize the R/P HEAD and the E. HEAD with a head eraser.
(3) Completely demagnetize the adjustment screwdriver.
(4) Unless instructed otherwise, set the various controls as follows:
– INPUT volume . . . . . maximum
– OUTPUT LEVEL volume . . . . . maximum
– DOLBY NR switch . . . . . OFF
– MONITOR switch . . . . . TAPE

1. Tape Transport Check

Load the transport check cassette. In the operational mode, illuminate the fixing guides of the R/P HEAD with a lamp and check to make sure the tape edge does not come in contact with the tape guide section.
The tape transport is the most important element in determing the performance of a cassette deck.
Avoid moving the various adjustment screws, nuts, etc., as much as possible. The THG-801 Tool Plate is a tool used primarily for precisely adjusting the height of the tape guide attached to a tape head.
This tools is indispensable in repairing various heads, when replacing heads, and for design purposes, in order to determine the location measurements for mechanical attachments.
Even when the height of the tape guide is accurately measured, during actual tape play, the tape may sometimes warp.
This is due to slight errors in dimensions of those parts which actually come in contact with the tape, such as cassette halves, heads, pinch-rollers, capstan shaft, etc. Therefore a mirror tape is used to confirm proper running of the tape.
In this way, the THG-801 Tool Plate and mirror tape are both used to insure good tape running.

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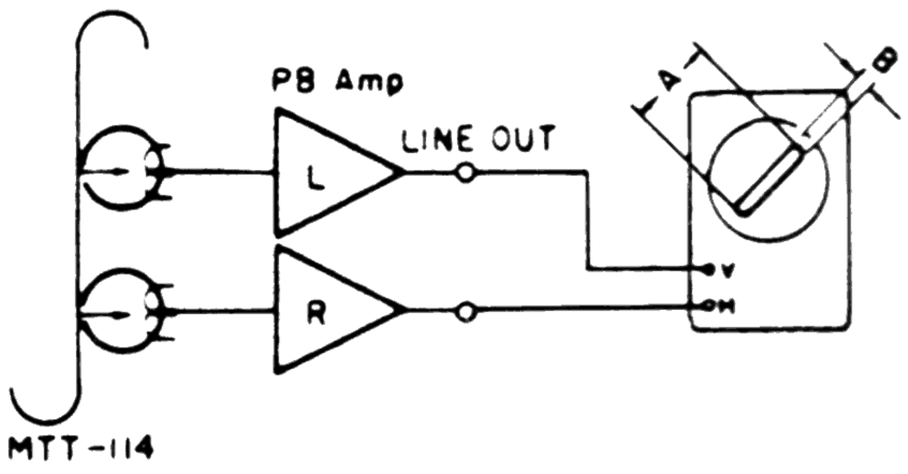
After having confirmed that the setting is correct, the mirror tape may warp anyway. In order to establish the titlt angles of the recording/plaback head and the erase head, adjust (by turning 1/4 – 1/2 turns) the level adjustment nut (311) of the tape guide (103). Refer to the pages on "Adjusting and checking the Mechanism Section" when replacing or adjusting the R/P HEAD.

2. Adjusting the Azimuth

(1) After completing the tape transport check load the test tape (A-BEX TCC-153)

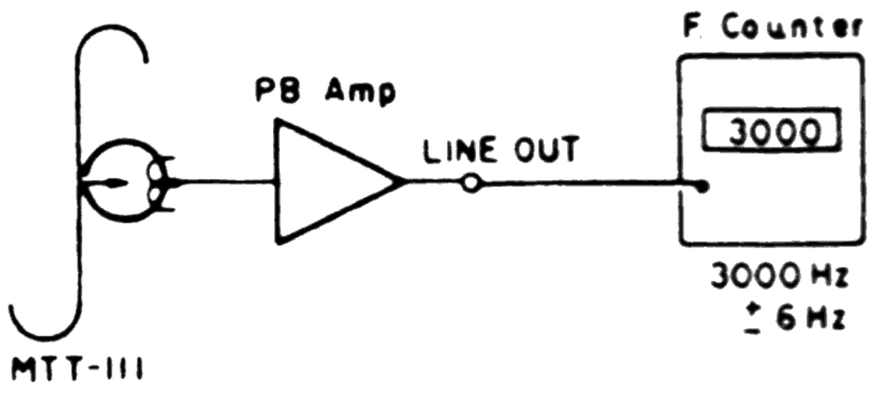
(2) Play back the test tape; adjust the azimuth nut so that section A of the resurge wave form is maximum and section B is minimum.



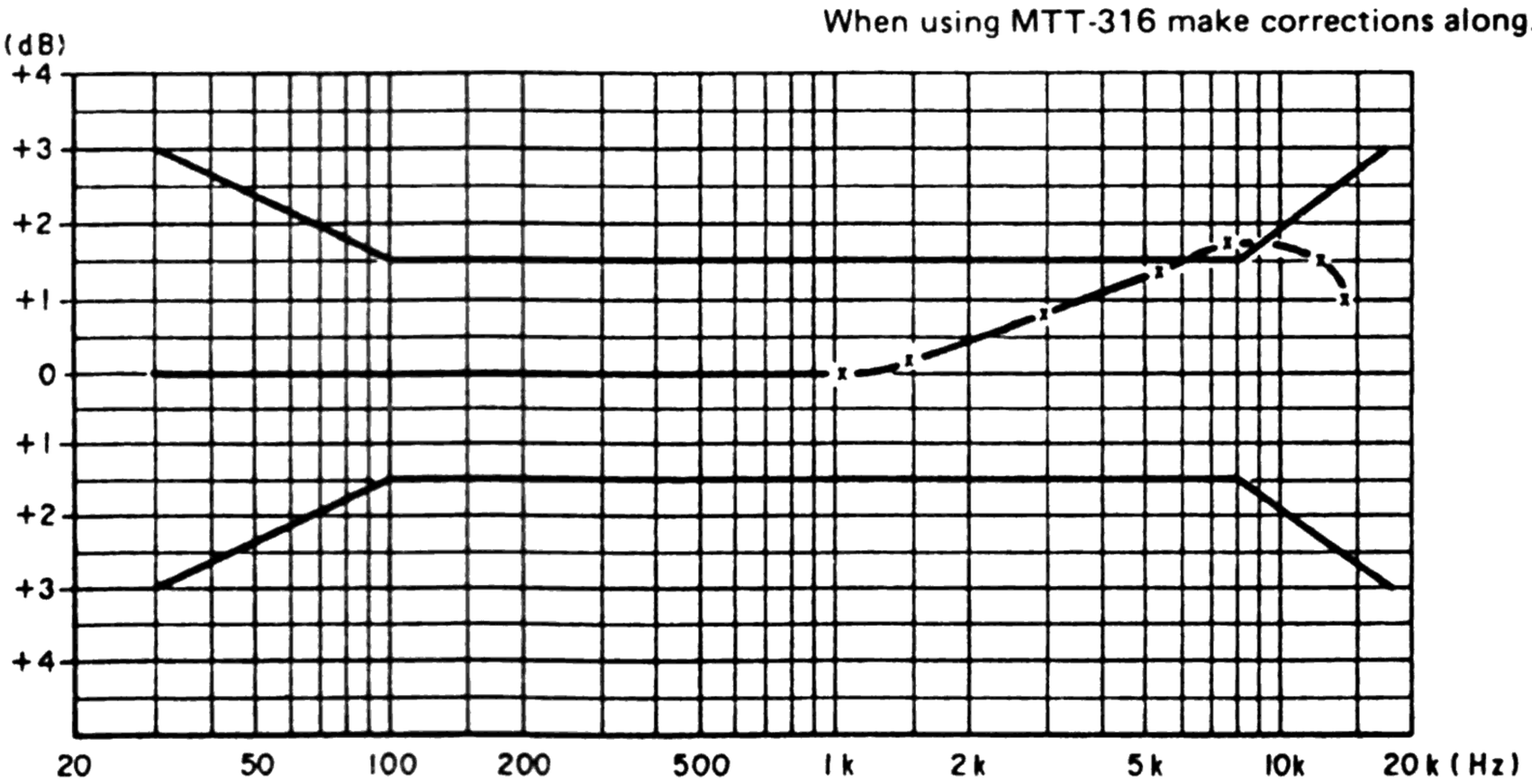
3. Checking and Adjusting the Tape Speed

1) Connect the frequency counter to the LINE OUT terminal and load the test tape (SONY TY-224).

2) Playback a test tape. At about halfway through the tape, where the tape transport is stable, adjust the adjustment points on the back of the capstan motor so that the frequency counter will have a reading within the the range of 3,000 Hz ± 6Hz.

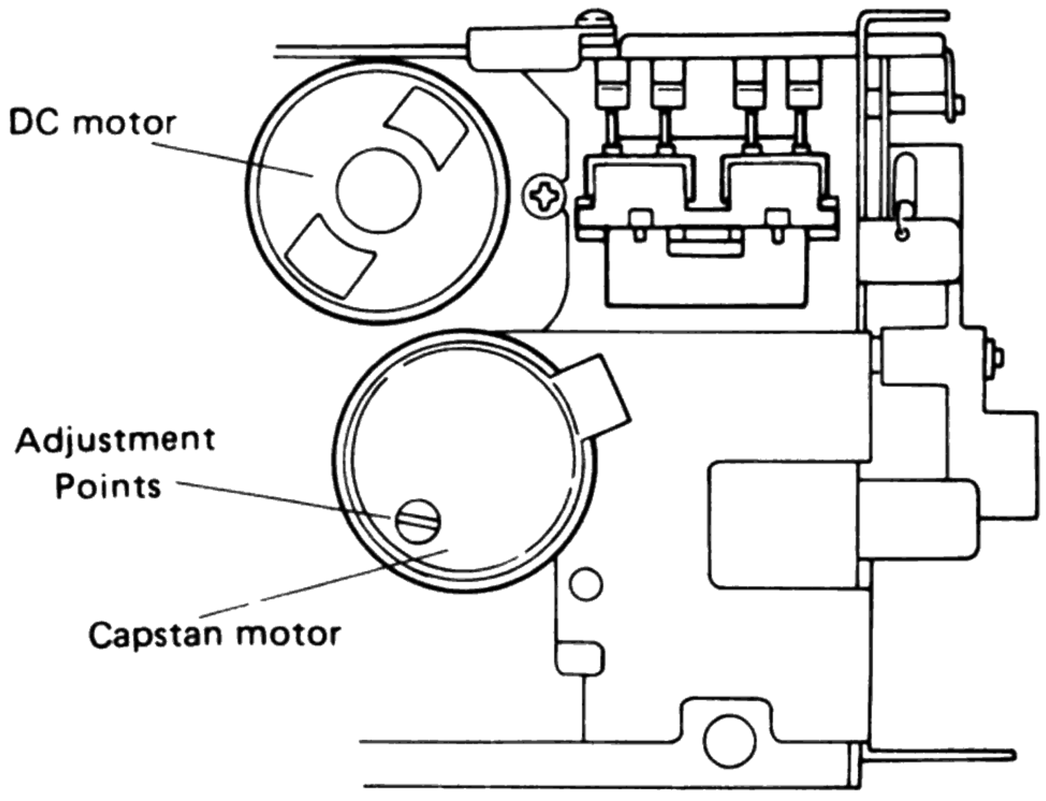


Playback Frequency Response

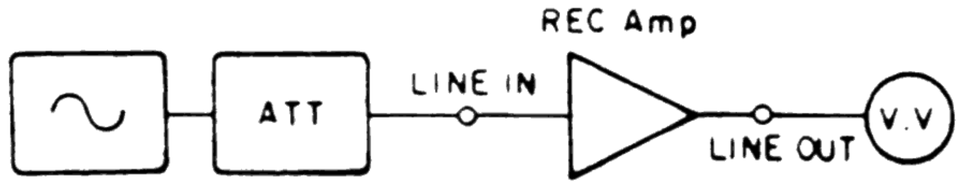


4. Adjusting the Input Sensitivity

(1) Set the MONITOR switch to SOURCE position, the operational mode at STOP. Supply a 400 Hz signal to the LINE IN terminal and set the input signal level (approx. –18 dB) so that the output level at the LINE OUT TERMINAL (L ch) becaomes 0dB.



(2) At the same time, check to make sure the R ch output level is also 0dB.



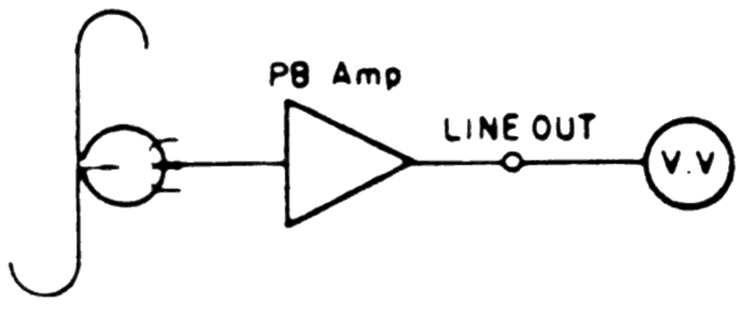
5. Adjusting Playback Section

(1) Adjusting the playback level

Play back the Dolby standard level test tape (A-BEX TCC-130) and adjust RT-101 (L ch), RT-201 (R ch) so that the LINE OUT voltage becomes 0 dB (0.775V).

(2) Adjusting the playback frequency response

Play back the test tape (A-BEX TCC-262) and check to make sure that the frequency response meets the specifications in the diagram.



Tape : A-BEX TCC-262

When using MTT-316 make corrections along.

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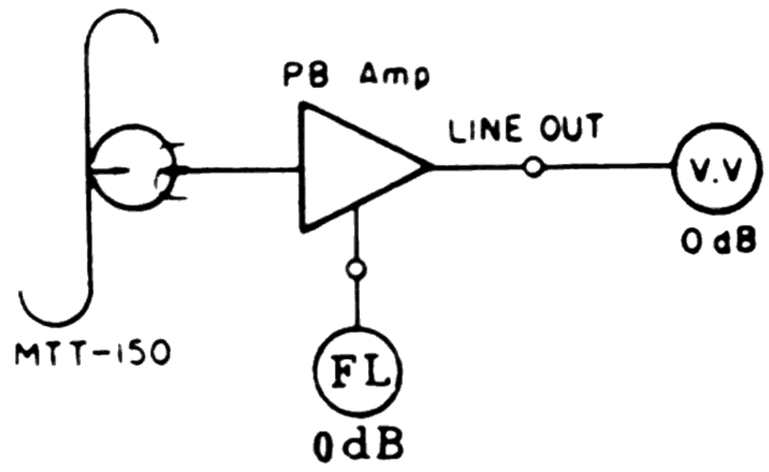
6. Adjusting the FL Meter

After adjusting the playback level, playback the test tape (A-BEX TCC-130) and adjust RT401 (L ch), RT402 (R ch) so that the FL meter indicates 0dB when the LINE OUT terminal level is 0dB (0.775V).

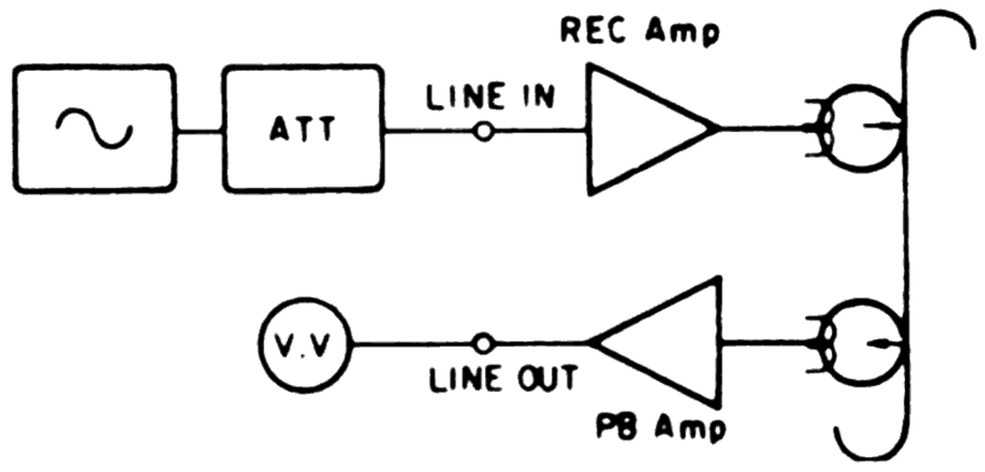


7. Adjusting the Recording Section

(1) Adjusting the record/playback overall frequency response.

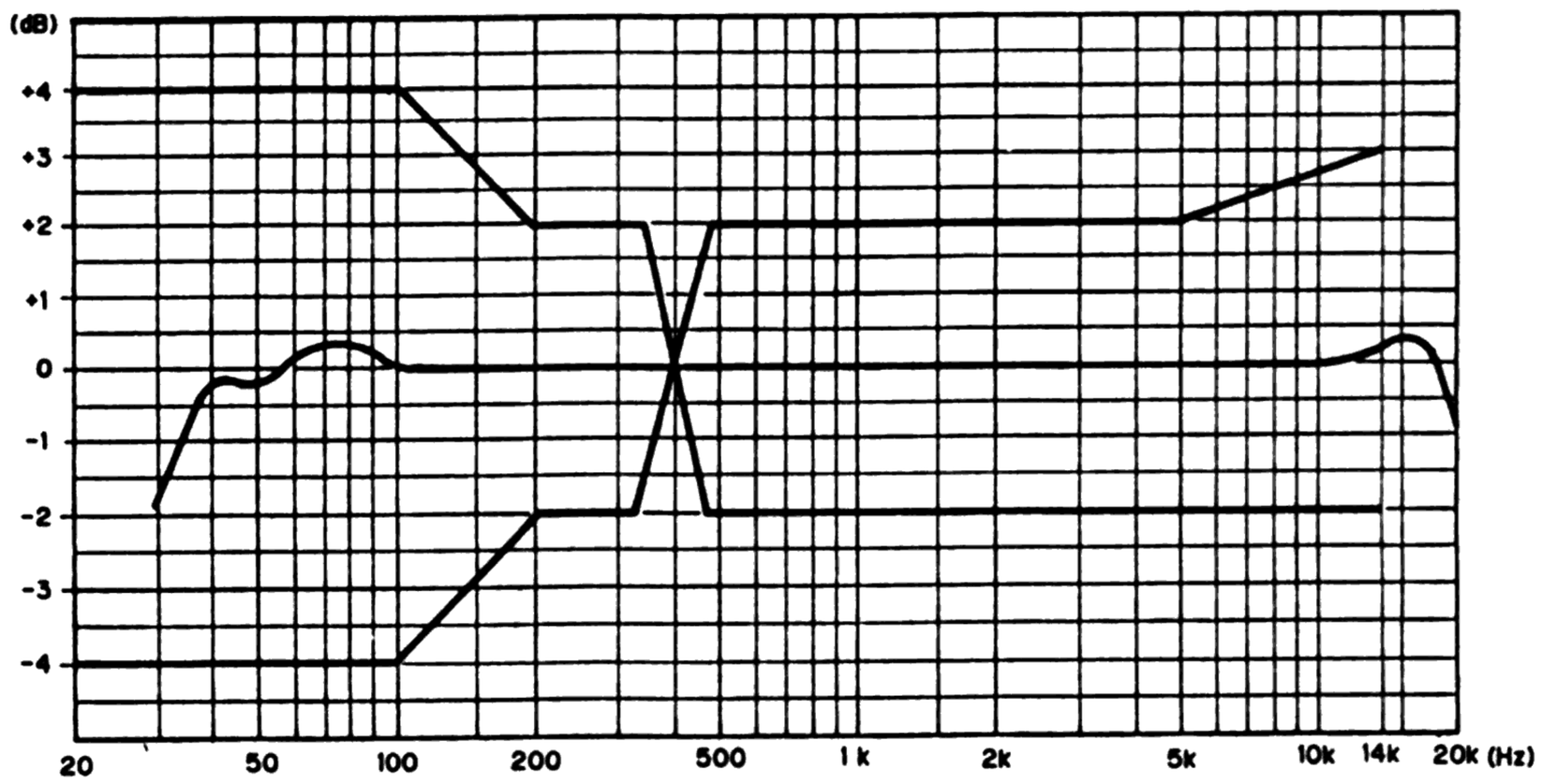
1) Load the test tape HD-X; record a signal with an input level of —38 dB, 1 kHz at the LINE IN terminal; play back this recording.

2) Change the frequency of the input signal to 12kHz, record and playback; adjust RT103 (L ch), RT203 (R ch) so that the characteristic standards meet the following diagram when compared to the 1kHz signal output level.



Record/Playback Overall Frequency Response

Tape: HD-X Dolby: off
Level: —20dB from Dolby.



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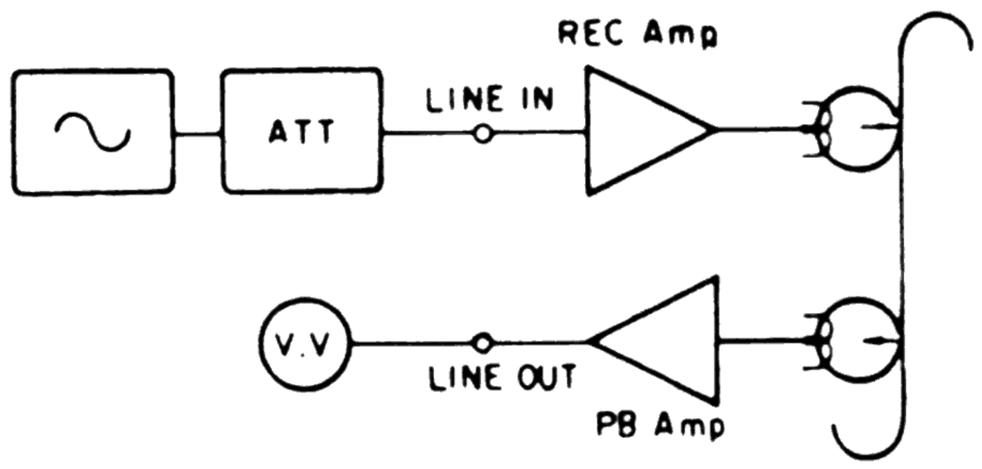
(2) Adjusting the record/playback levels

1) Load the test tape HD-X/C-60 and record a signal of 1kHz (—38 dB).
2) Adjust RT102 (L ch), RT202 (R ch) so that the output level is the same when the MONITOR switch is switched from SOURCE to TAPE position.

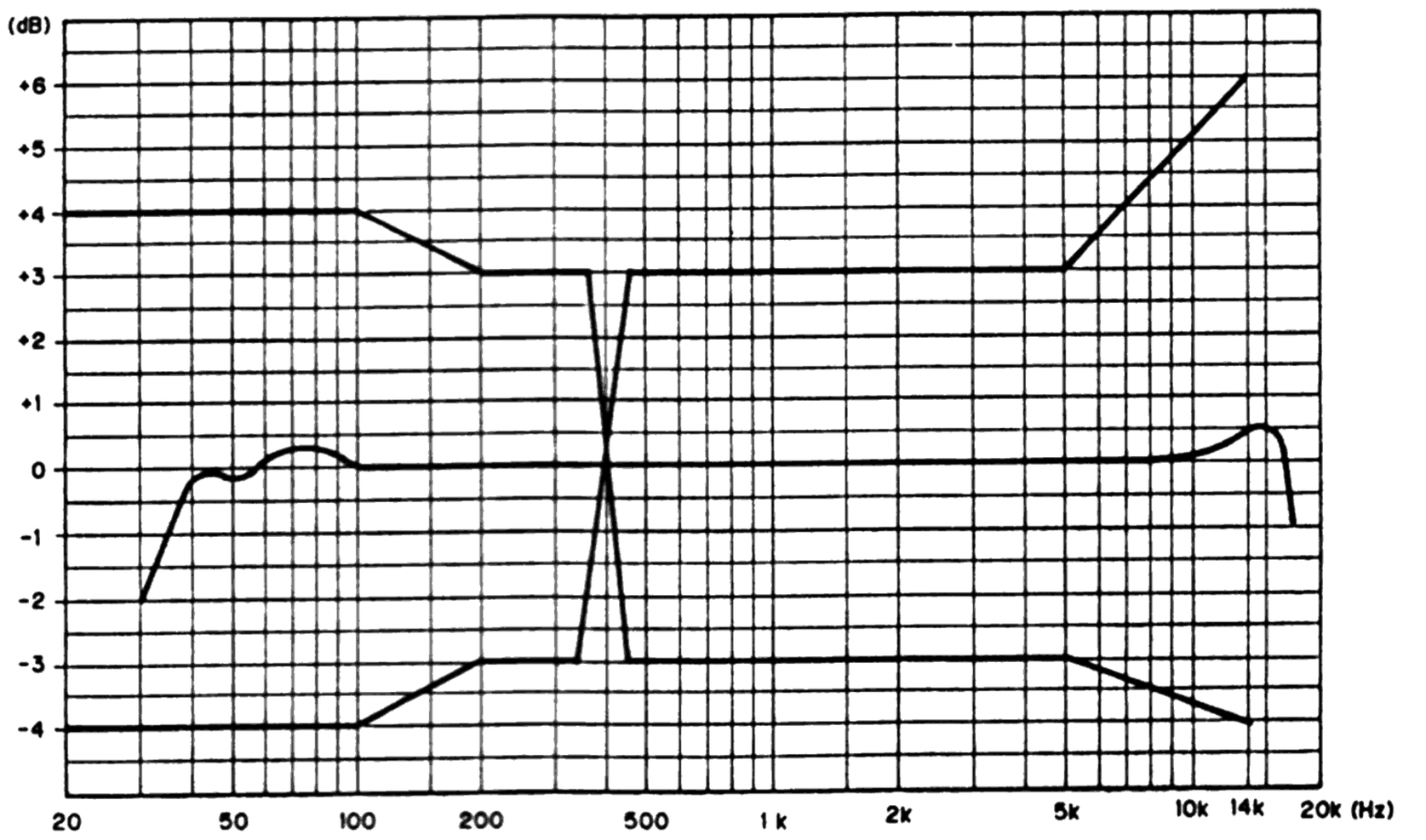


(3) Checking the Dolby C record/playback overall frequency response

1) Set the DOLBY NR switch to the "C" position.
2) Using the test tapes MD, HD-X/C-60, RD, perform record/playback in the same manner as 7-(1).
3) Check to make sure that the record/playback overall frequency response meets the specifications in the diagram.

Dolby C Record/Playback Overall Frequency Response.

Tape: HD-X
Dolby: on, C
Level: —20dB from Dolby



DOLBY-C NR RECORD/PLAY BACK

- **Beat Interference**

Beat interference may result if the unit is used close to an AM tuner. In this case separate the distance between the tuner and the cassette deck.

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PARTS LIST OF EXPLODED VIEW

Ref. No.	Part No.	Part Name	Remarks
1	4110636409	CHASSIS ASS'Y	
	4110636412	CHASSIS ASS'Y	E1 only
2	4110637408	CHASSIS	
	4110637411	CHASSIS	E1 only
3	4610162004	FELT PAD	
4	4118383000	SHIELD LABEL	
5	2U-1541	POWER SUPPLY UNIT	
6	2U-1540	AUDIO UNIT	
⚠ 7	2335589003	POWER TRANS	E2, EK, EA
	2335595000	POWER TRANS	EU only
	2335599006	POWER TRANS	EC only
	2335537000	POWER TRANS	E1 only
8	4110660006	TRANS BRACKET	
9	1130919002	PUSH BUTTON (A)	BK
	1130919015	PUSH BUTTON (A)	GO
10	1031019001	FRONT ESC, ASS'Y	BK
	1031019014	FRONT ESC, ASS'Y	GO
11	4110742005	SHIELD SHEET	
12	VM-862	CASSETTE MECHA	
13	4118347101	EARTH PLATE (A)	
14	4118346225	ANGLE	
15	4122008012	BUSHING PLATE	
⚠ 16	2062002031	AC CORD WITH PLUG	E2
	2062061001	AC CORD	EU, EC
	2062024006	AC CORD WITH LABEL	EK
	2062025005	AC CORD	EA
	2006031026	AC CORD	E1
⚠ 17	4450056008	CORD BUSH	
⚠ 18	2123315023	VOLTAGE SELECTOR	E1 only
19	1058089218	BOTTOM COVER	
20	1290082002	COLOR FILTER	
21	1430460206	METER WINDOW	
22	4310234106	PS LEVER ASS'Y	BK
	4310234119	PS LEVER ASS'Y	GO
23	DE02A01	EJECT KNOB SUB ASS'Y	BK
	DE02A02	EJECT KNOB SUB ASS'Y	GO
24	4310217000	EJECT KNOB	BK
	4310217013	EJECT KNOB	GO
25	4318104102	EJECT PLATE	
26	1441631105	FRONT PANEL ASS'Y	BK
	1441631118	FRONT PANEL ASS'Y	GO
27	1120512008	VOLUME KNOB (A)	BK
	1120512011	VOLUME KNOB (A)	GO
28	1120485009	VOLUME KNOB (B)	BK
	1120485025	VOLUME KNOB (B)	GO
29	1030919209	CASSETTE WINDOW	BK
	1030919238	CASSETTE WINDOW	GO
30	4110564160	C. WINDOW ESC.	
31	1020286007	TOP COVER	BK
	1028319345	TOP COVER	GO
32	4110745002	EARTH GUIDE	

Ref. No.	Part No.	Part Name	Remarks
50	3934034000	FL METER	
51	2048114008	4P PIN JACK	
52	2048230005	H/P JACK	
53	2120283006	PUSH SWITCH	
54	2124388004	TACT SWITCH	
55	2110508005	V1602V35FB	BIAS/VAL/CAL
56	2110470007	V1620V20FA103	OUTPUT
57	2110493000	V16V20KA104R4R	INPUT
⚠ 58	2129136028	POWER SWITCH	
102	4737500015	3 ×8 CBTS(P)-Z	
103	4737004003	4 ×8 CBTS(S)-Z	
104	4737501001	3 ×10 CBTS(P)-Z	
105	4756102012	12 NUT	
106	4737002005	3 ×6 CBTS(S)-Z	
108	4730359014	3 ×16 CBRTS	E1 only
110	4737003004	3 ×8 CFTS(S)-Z	
112	4737503038	4 ×10 CTTS(P) BK	BK
	4737503041	4 ×10 CTTS(P) NI	GO
113	4737501014	3 ×14 CBTS (P)-Z	

PARTS LIST OF PACKING & ACCESSORIES

Ref. No.	Part No.	Part Name	Remarks
	2032101001	2P CONNECTOR CORD	
	5111563004	INST. MANUAL	
	5111575005	INST. MANUAL	EU only
	5040092060	STYLEN PAPER	
	5038054104	PACKING	
	5131167008	CONTROL CARD	
	5011108077	CARTON CASE	

WARNING:
Parts marked with ⚠ and/or shading have special characteristics important to safety.
Be sure to use the specified parts for replacement.

Remarks symbols in the parts list refer to the following countries and areas.

EA:	Australia	EC:	Canada
E1:	Multiple voltage model	EU:	U.S.A.
E2:	European continent	EK:	United Kingdom

"BK" in the Remarks column refers to models with black front panels "GO" to models with gold front panels.

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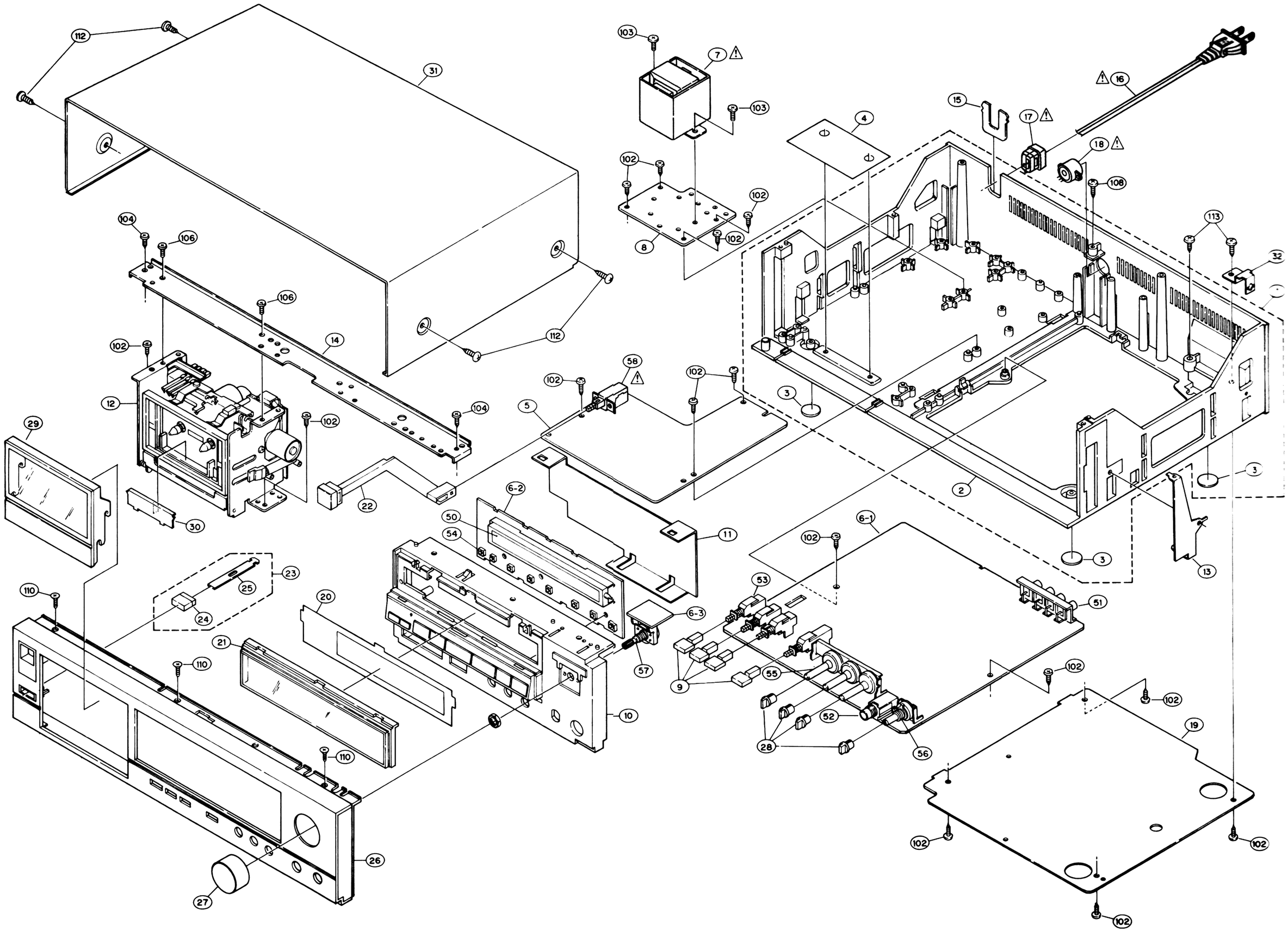
EXPLODED VIEW OF CABINET AND CHASSIS GROUP



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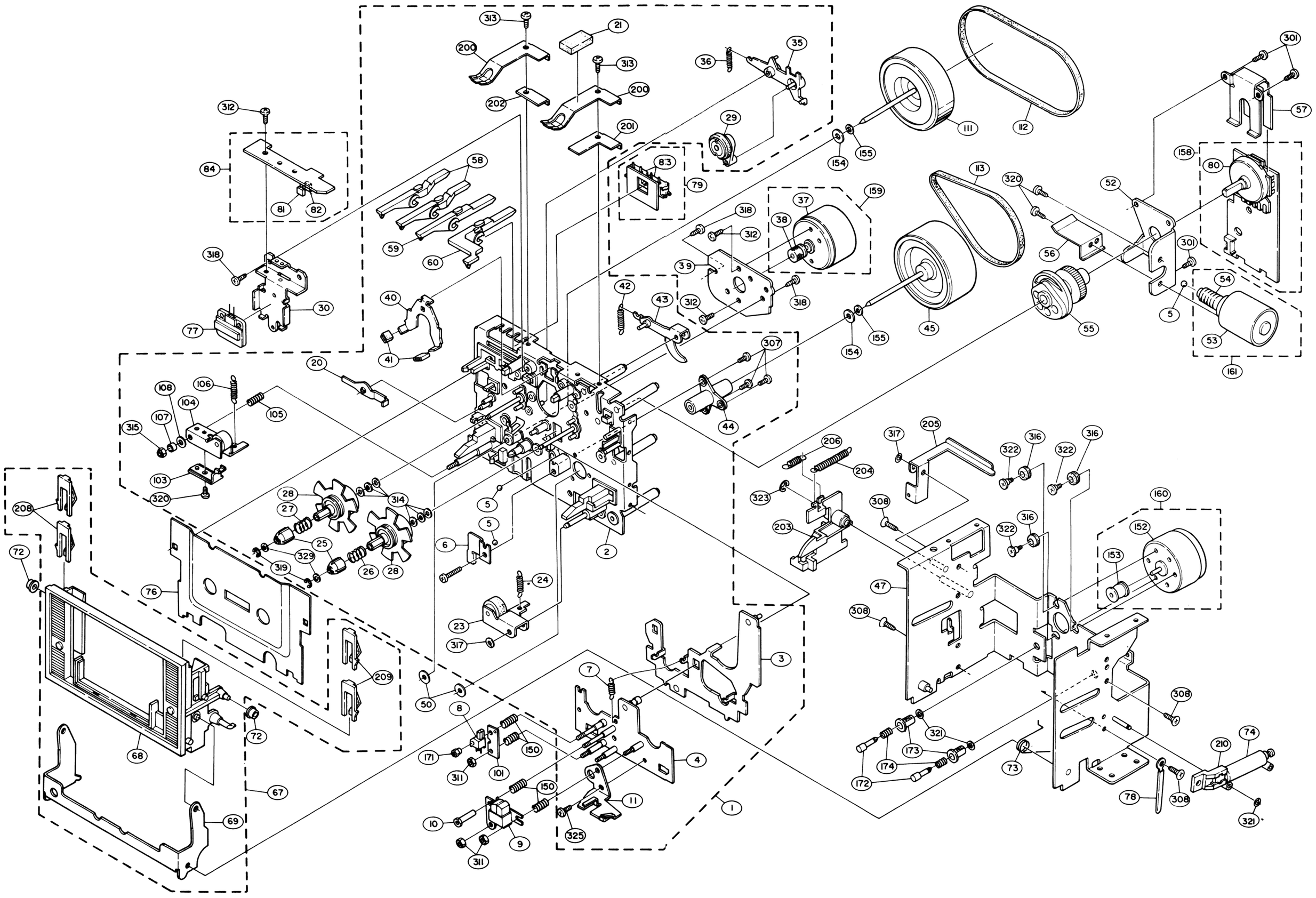
EXPLODED VIEW OF VM862 MECHANISM UNIT



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PARTS LIST OF CASSETTE MECHANISM EXPLODED VIEW

Ref. No.	Part No.	Part Name	Remarks
1	4110678205	MECHA BASE(G) ASS'Y	
2	4110679107	MECHA BASE ASS'Y	
3	4310242101	HEAD SLIDER ASS'Y	
4	4310244109	HEAD PLATE ASS'Y	
5	4258011009	STEEL BALL D3	
6	4310240006	BALL GUIDE PLATE	
7	4638230002	SPRING	
8	3918826001	ERASE HEAD	
9	3918076107	R/P HEAD	
10	4438671104	SPECIAL NUT	
11	4418994209	CORD HOLDER	
20	4338224208	STOPPER	
21	4610154083	CUSHION	
23	4338194105	P ROLLER ARM ASS'Y	
24	4638231108	SPRING	
25	4210446104	REEL DRIVER	
26	4630522103	SPRING	
27	4630538003	SPRING	
28	4218401109	REEL DRIVE WHEEL	
29	4330449201	I. ARM(B) G ASS'Y	
30	4410692101	LAMP HOLDER	
35	4338236306	IDLER ARM(A) ASS'Y	
36	4638271003	SPRING	
37	2170161000	REEL MOTOR	
38	4218403000	PULLEY	
39	4410850008	DC MOTOR FIX PLATE	
40	4310241005	BRAKE	
41	4618127106	BRAKE SHOE	
42	4638234105	SPRING	
43	4338232203	BRAKE ARM ASS'Y	
44	4438648302	METAL HOUSING ASS'Y	
45	4210389106	FLY WHEEL ASS'Y	
47	4410837102	MECHA STAY ASS'Y	
50	4770090074	WASHER	
52	4118966305	CAM MOTOR HOLDER	
53	2178070009	DC MOTOR	
54	4248025607	WORM GEAR	
55	4248027401	CAM	
56	4140414109	OIL FENCE	
57	4428018308	ENCODER BRACKET	
58	4330493105	HOLE SENSOR (A)	
59	4330494104	HOLE SENSOR (B)	
60	4330495103	HOLE SENSOR (C)	
67	DC05A01	CASSETTE BOX SUB ASS'Y	
68	1030922403	CASSETTE BOX	
69	4330459314	C. BOX HOLDER	
72	4318097002	COLLAR	
73	4630524101	BOX SPRING	
74	4698013104	AIR DAMPER	
76	1441637002	ESC PLATE	
77	3939179012	LN0105YP4 (YW)	
78	4458028009	CORD HOLDER	
79	2U-15151	HOLE SENS PWB ASS'Y	
80	2123331308	ROTARY ENCODER	
81	3939178000	LN25RCP	
82	3939026000	PN150	
83	2124665002	SLIDE SWITCH	
84	2U-15152	REEL PULSE PWB ASS'Y	
101	4490030107	E HEAD BASE	
103	4330407308	TAPE GUIDE	
104	4330408006	P-ROLLER ARM-L ASS'Y	
105	4630414101	SPRING	
106	4630480009	SPRING	
107	4430539008	WASHER	
108	4770240002	WASHER	
111	4218365504	CAPSTAN WHEEL ASS'Y	
112	4238026108	BELT	
113	4238030110	BELT	
150	4638819012	SPRING	
152	2170162009	CAPSTAN MOTOR	
153	4218383007	MOTOR PULLEY	
154	4258058001	WASHER	
155	4770090016	WASHER	
158	2U-15150	MECHA PWB ASS'Y	
159	DR04A04	REEL MOTOR SUB ASS'Y	
160	DC07A02	CAP MOTOR SUB ASS'Y	
161	DC06A04	CAM MOTOR SUB ASS'Y	
171	4438818006	SPECIAL NUT	
172	4228175001	CAPSTAN JOURNAL (1)	
173	4228176107	CAPSTAN JOURNAL (2)	
174	4638640100	SPRING	
200	4638829303	CASSETTE SPRING	
201	4428154107	C P SUPPORT	
202	4410897003	SPRING GUIDE	
203	4338269506	HOOK	
204	4630561009	SPRING	
205	4128829101	ANGLE	
206	4638257001	SPRING	
208	1038243304	CASSETTE SUPPORT (L)	
209	1038243317	CASSETTE SUPPORT (R)	
210	4338271400	DAMPER GUIDE	
301	4737002005	3 ×6 CBTS(S)-Z	
307	4713202010	2.6 ×5 CBS	
308	4737021002	2.6 ×6 CFTS(S)	
310	4713802025	2.6 ×14 CBS	
311	4756020000	2N	
312	4713802012	2.6 ×3 CBS-Z	
313	4737001006	2.6 ×5 CBTS(S)-Z	
314	4770265016	WASHER	
315	4770269009	NYLON NUT	
316	4620086002	MOTOR CUSHION	
317	4751121108	SLIT WASHER	
318	4737500002	3 ×6 CBTS(P)-Z	
319	4761114008	1.5E RING	
320	4713801039	2 ×3 CBS-Z	
321	4751120109	SLIT WASHER	
322	4770294003	SPECIAL SCREW	
323	4761003009	3E RING	
325	4713201011	2.6 ×4 CBS-Z	
329	4751139103	2.1W	

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PARTS LIST OF 2U-1541 POWER LOGIC UNIT

Ref. No.	Part No.	Part Name	Remarks
SEMICONDUCTOR GROUP			
IC1	2620913009	μPD7527ACU-211	
IC2, 3	2620447009	BA6109U1	
IC901	2630510007	NJM78M08FA	
IC902	2630511006	NJM79M08FA	
TR1, 5	2690015908	DTC124XS (22K-47K)	
TR3, 902, 904	2730178022	2SC1740 (R/S)	
TR901	2710105002	2SA966 (Y)	
TR903, 904	2690022904	DTA143ES (4.7K-4.7K)	
D1, 915	2760432903	ISS270A	
D2	2760468919	HZS9B-2TD	
D3～5, 13, 26, 914	2760049011	IS2076A	
D6, 901, 902, 905～912	2760427905	DSM1A2 (TYPE 2)	
D7	2760052082	HZ11A-3	
D8	2760460920	HZS5C-3TD	
D10	2760465925	HZS7B-3TD	
D903	2760478925	HZS18-3TD	
D904	2760461916	HZS6A-2TD	
D913	2760463914	HZS6C-2TD	
RESISTOR GROUP			
R20	2440077028	RS14B3D180JNBF	18 Ω 2 W
R901	2410163001	RD14B2H121J	120 Ω 1/2 W
CAPACITOR GROUP			
			Ceramic
C1	2533615009	CC45SL1H330J	33PF 50 V
C9, 11	2539030060	CK45=1E103K	0.01 μF 25 V
C12	2539030086	CK45=1E223K	0.022 μF 25 V
C10, 12	2539031917	CK45=1E683K	0.068 μF 25 V
C4～7	2531004007	CK45B1H102K	0.001 μF 50 V
C901	2538010007	CK45=2GAC103P	0.01 μF 400 V AC
C909, 910	2544252037	CE04W1A101M	100 μF 10 V
C913	2544254006	CE04W1C100M	10 μF 16 V
C902	2544254051	CE04W1C221M	220 μF 16 V
C904	2544256033	CE04W1E470M	47 μF 25 V
C905	2544256046	CE04W1E101M	100 μF 25 V
C906	2544256059	CE04W1E221M	220 μF 25 V
C2, 13, 14	2544258002	CE04W1V4R7M	4.7 μF 35 V
C912	2544260045	CE04W1H010M	1 μF 50 V
C3	2544260061	CE04W1H3R3M	3.3 μF 50 V
C914	2544250068	CE04W0J102M (SME)	1000 μF 6,3 V
C907, 908, 911	2544256091	CE04W1E222M (SME)	2200 μF 25 V
C8	2544255018	CE04W1C472M (SME)	4700 μF 16 V
C903	2544258086	CE04W1V471M (SME)	470 μF 35 V

Ref. No.	Part No.	Part Name	Remarks
OTHER PARTS			
	4170253013	RADIATOR	IC901, 902
SW901 ⚠	2120286003	POWER SWITCH	
CN1	2050343087	8P CONN. BASE (KR-PH)	
CN2	2050343061	6P CONN. BASE (KR-PH)	
CN3, 4	2050375013	11P CONN. BASE (KR-PH)	
CN5	2050343032	3P CONN. BASE (KR-PH)	
W5	2042253004	10P KR-DA CONN. CORD	
	2020022008	FUSE HOLDER	E1 only
	2061031045	FUSE (0.25) A	E1 only

PARTS LIST OF 2U-1515 MECHANISM UNIT

Ref. No.	Part No.	Part Name	Remarks
SEMICONDUCTOR GROUP			
D14～21	2760432903	ISS270A	
D30	3939179012	LN0105YP4(YW)	
D31	3939178000	LN25RCP	
TR30	3939026000	PN150	
OTHER PARTS GROUP			
	2124665002	SLIDE SWITCH	
	2123331308	ROTARY ENCODER	
	2038180000	5P DA-DA CONN. CORD	
	2040168036	6P KR-DS CONN. CORD	
	2042195010	8P KR-DS CONN. CORD	
	2050355033	3P KR CONN. CORD	
	2050355062	6P KR CONN. BASE (L)	

- The carbon resistors rated at 1/4 W, 1/6 W are not listed herein.

WARNING:
Parts marked with ⚠ and/or shading have special characteristics important to safety.
Be sure to use the specified parts for replacement.

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PARTS LIST OF 2U-1540 AUDIO UNIT

Ref. No.	Part No.	Part Name	Remarks
SEMICONDUCTOR GROUP			
IC102, 202	2630455007	CX20187	
IC301	2630317006	M-5220P	
IC302, 308	2630257001	M-5218P	
IC303	2630456006	μPC1272C	
IC304	2790019008	AN90B20	
IC305	2630354001	μPC1297CA	
IC801, 802	2620440006	BA6146	
TR101, 201 102, 202, 105, 205	2730178022	2SC1740(R/S)	
TR103, 203	2750048909	2SK381 (D/LE)	
TR104, 204	2690015908	DTC124XS(22K-47K)	
TR301	2740036002	2SD468(C)	
TR302, 303	2730245023	2SC2603E/F	
TR304, 305	2690014909	DAT124XS(22K-47K)	
TR310, 312, 314	2690015908	DTC124XS(22K-47K)	
TR313	2690014909	DTA124XS(22K-47K)	
TR315	2690019904	DTA143XS(4.7K-10K)	
D301, 302	2760049011	IS2076A	
D801～808	2760432903	ISS270A	
D350	2760218046	HZ9B-1	
RESISTOR GROUP			
R311	2442036012	RD14B2H3R9JFRF	FUSELBLE
VR301	2110470007	V1620V20FA103	OUTPUT VR
VR302	2110508005	V1602V35FB	
VR304	2110493000	V1620V20KA104R	INPUT VR
RT101, 201	2116064022	V06PB104	PB GAIN
RT102, 202 103, 203	2116064093	V06PB223	REC CAL
CAPACITOR GROUP			
			Ceramic
C143, 243	2533627000	CC45SL1H101J	100PF 50 V
C101, 201	2533635005	CC45SL1H221J	220PF 50 V
C140, 240	2533631009	CC45SL1H151J	150PF 50 V
C144, 244	2531055027	CK45B1H821K	820PF 50 V
C131, 231	2539031056	CK45＝1E182K	0.0018 μF 25 V
C136, 236 132, 232, 134, 234	2539031069	CK45＝1E272K	0.0027 μF 25 V
C128, 228	2539030031	CK45＝1E332K	0.0033 μF 25 V
C102, 202	2539031085	CK45＝1E562K	0.0056 μF 25 V
C308	2539030057	CK45＝1E682K	0.0068 μF 25 V
C145, 245, 301, 302	2539030060	CK45＝1E103K	0.01 μF 25 V
C307	2539030073	CK45＝1E153K	0.015 μF 25 V
C141, 241, 351, 353	2539030086	CK45＝1E223K	0.022 μF 25 V
C142, 242, 138, 238	2539030099	CK45＝1E333K	0.033 μF 25 V
C356	2539031001	CK45＝1E473K	0.047 μF 25 V
C123, 223, 111, 211	2539031014	CK45＝1E683K	0.068 μF 25 V
C146, 246	2531131909	CK45B2H391KT	390PF 500 V
C310	2534406903	CC45SL2H040CT	4PF 500 V
C163, 263	2539031069	CK45＝1E272K	0.0027 μF 25 V
			Electrolytic
C359	2544260032	CE04W1HR47M	0.47 μF 50 V
C116, 216, 305	2544260045	CE04W1H010M	1 μF 50 V
C601, 701	2544260058	CE04W1H2R2M	2.2 μF 50 V
C129, 229, 306, 354, 350	2544258002	CE04W1V4R7M	4.7 μF 35 V
C103, 203, 115, 215, 127, 227, 139, 239 161, 261 357, 358	2544254006	CE04W1C100M	10 μF 16 V
C602, 702	2544254019	CE04W1C220M	22 μF 16 V
C137, 237, 311, 312	2544252024	CE04W1A470M	47 μF 10 V
C303, 304	2544252037	CE04W1A101M	100 μF 10 V
C108, 208, 121, 221	2544228016	CE04W1HR15M (LL)	0.15 μF 50 V
C110, 210, 122, 222	2544228029	CE04W1HR22M (LL)	0.22 μF 50 V
C107, 207, 120, 220	2544228948	CE04W1HR47MT (LL)	0.47 μF 50 V
C105, 205, 117, 217	2543056027	CE04D1H2R2MBP (SME)・	2.2 μF 50 V
C118, 218	2543056043	CE04D1H4R7MBP (SME)	4.7 μF 50 V
			Film
C130, 230 102, 202	2551120097	CQ93M1H562J	0.0056 μF 50 V
C106, 206, 119, 219	2551120084	CQ93M1H472J	0.0047 μF 50 V
C113, 213, 125, 225	2551121009	CQ93M1H682J	0.0068 μF 50 V
C104, 204	2551121012	CQ93M1H822J	0.0082 μF 50 V
C114, 214, 126, 226	2551121025	CQ93M1H103J	0.01 μF 50 V
C109, 209, 147, 247	2551121041	CQ93M1H153J	0.015 μF 50 V
C112, 212, 124, 224	2551122008	CQ93M1H473J	0.047 μF 50 V
C309	2554078081	CQ93P2A562J	0.0056 μF 100 V

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Ref. No.	Part No.	Part Name	Remarks
OTHER PARTS GROUP			
L101, 201	2310825009	BIAS FILTER	
L102, 202, 104, 204	2329007009	SKEWING COIL	
L103, 203	2320109003	MPX FILTER	
L105, 205	2350020916	INDUCTOR 822JT	
L106, 206	2350020945	INDUCTOR 153JT	
L107, 207	2390010009	HX STEP UP COIL	
L301	2350019914	INDUCTOR 122JT	
L303	2398022002	OSC COIL	
S301	2124667000	4P PUSH SWITCH	
SW801 ~ 808	2124388907	TACT SWITCH	
FL801	3934044003	FIP24CW9Y	
J301	2048255006	H/P JACK	
J302	2048114008	4P PIN JACK	
	4140421105	SHIELD BRACKET (M)	
CN301	2050233045	4P EH CONNECTOR BASE	
CN302	2050343003	10P CONN. BASE (KR-PH)	
CN303	2050233061	6P EH CONNECTOR BASE	
CN304	2050343074	7P CONN. BASE (KR-PH)	
W301	2040197023	6P DA-DA CONN. CORD	
W304	2042243043	7P KR-DA CONN. CORD	
W3	2046162007	11P KR-DA CONN. CORD	
W4	2046163006	11P KR-DA CONN. CORD	
W6	2034460009	3P KR-DA CONN. CORD	

- The carbon resistors rated at 1/4 W, 1/6 W are not listed herein.

WARNING:

Parts marked with ⚠ and/or shading have special characteristics important to safety. Be sure to use the specified parts for replacement.

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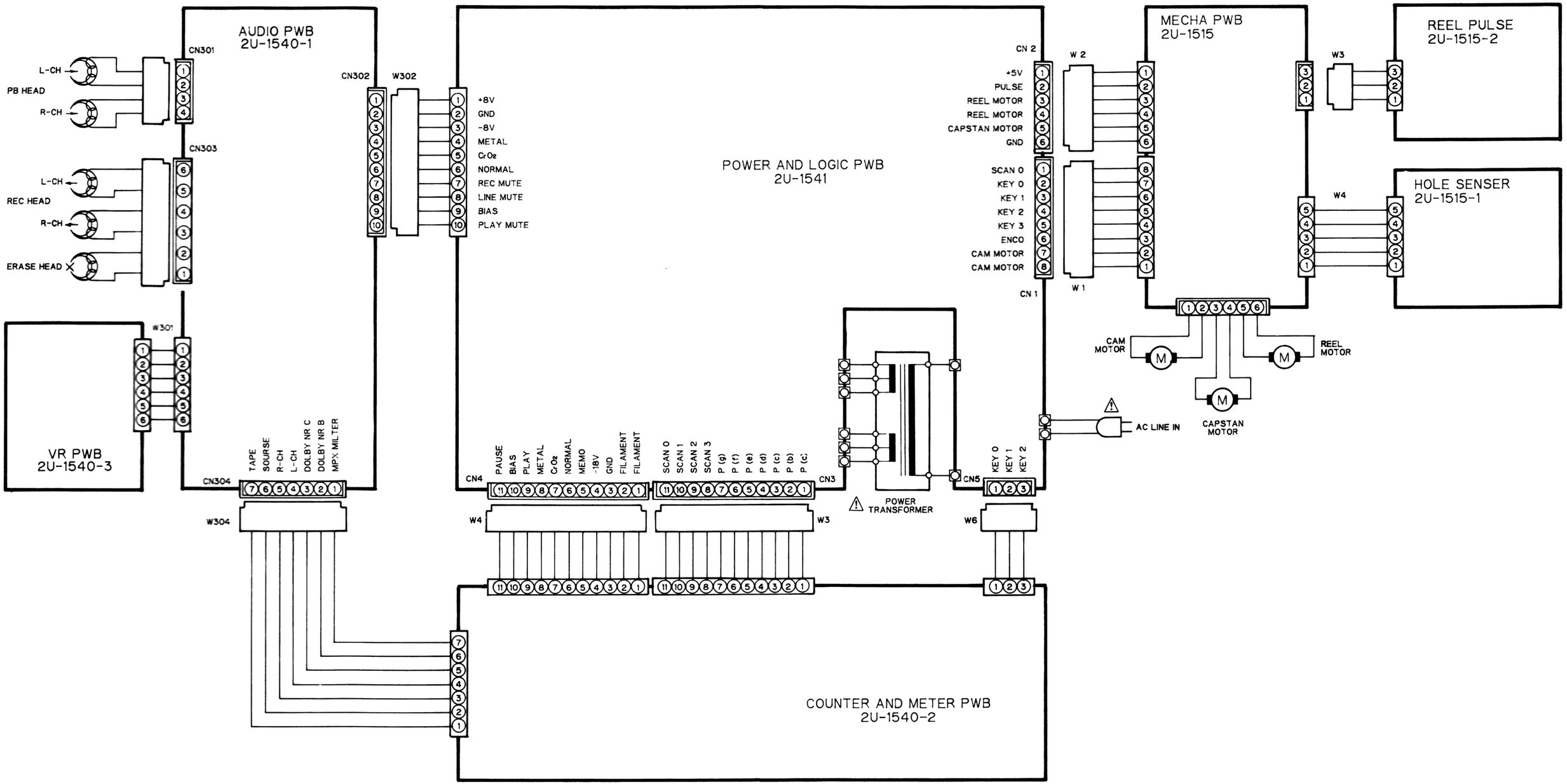
WIRING DIAGRAM



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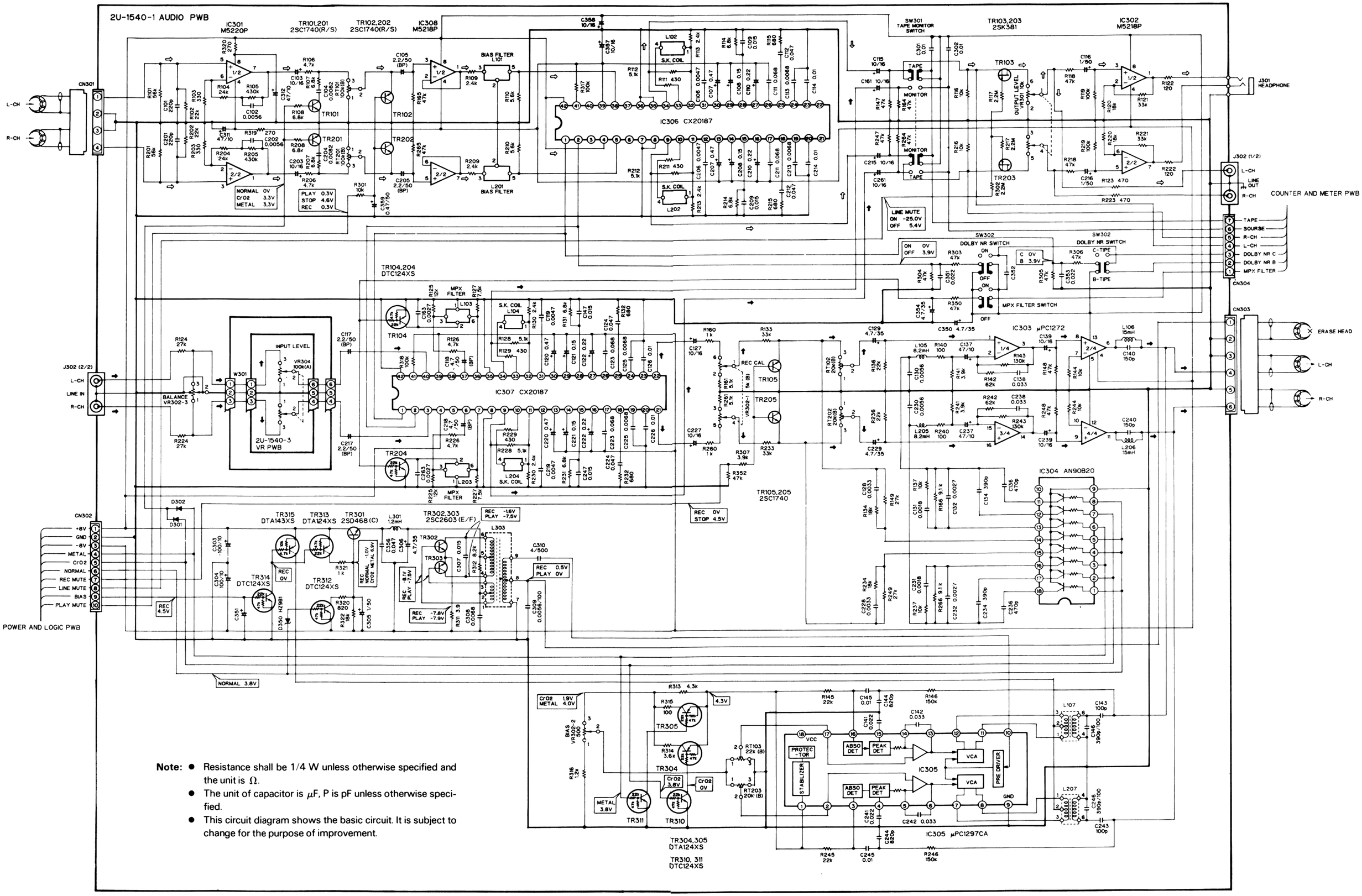
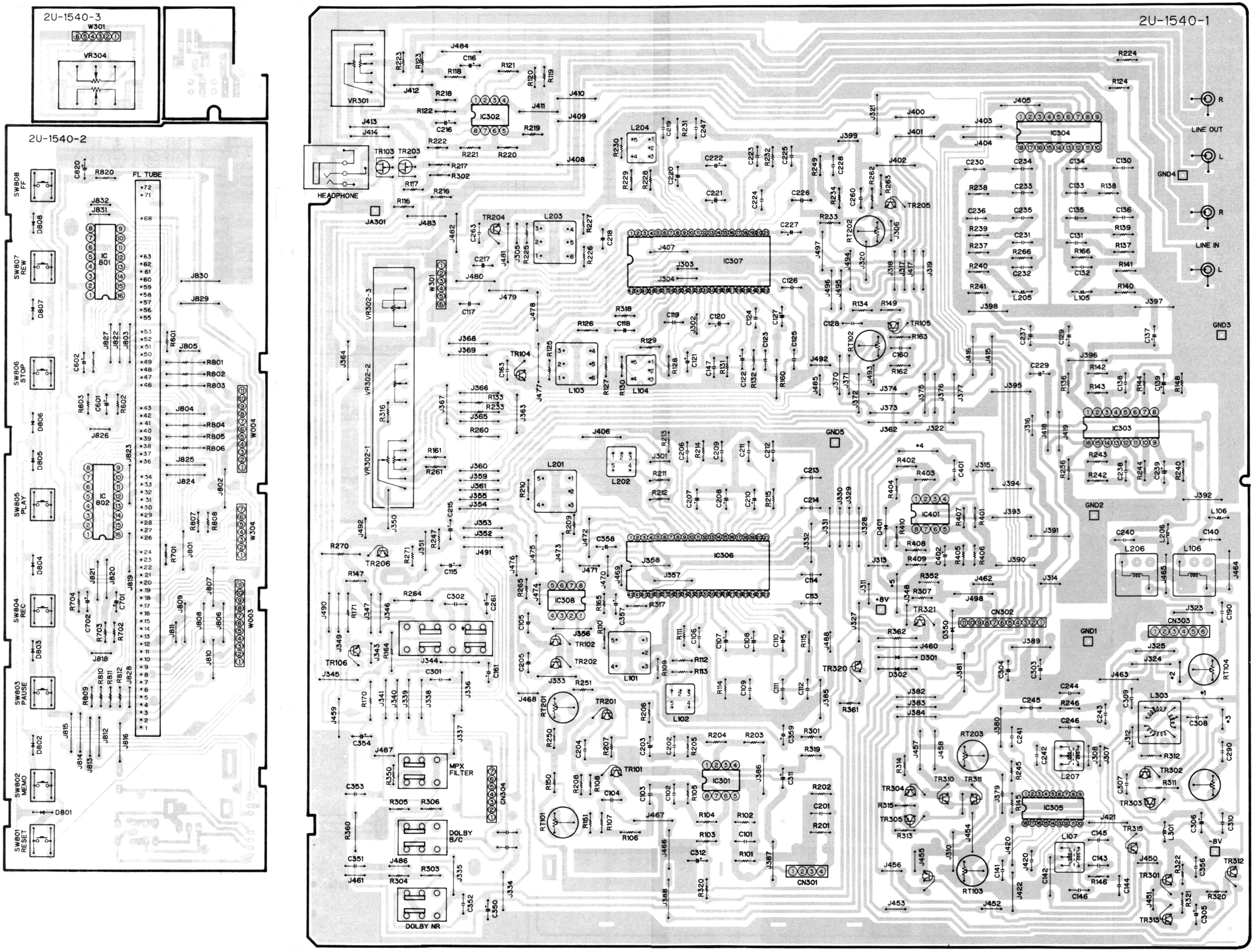
SCHEMATIC DIAGRAM OF AUDIO AMP UNIT

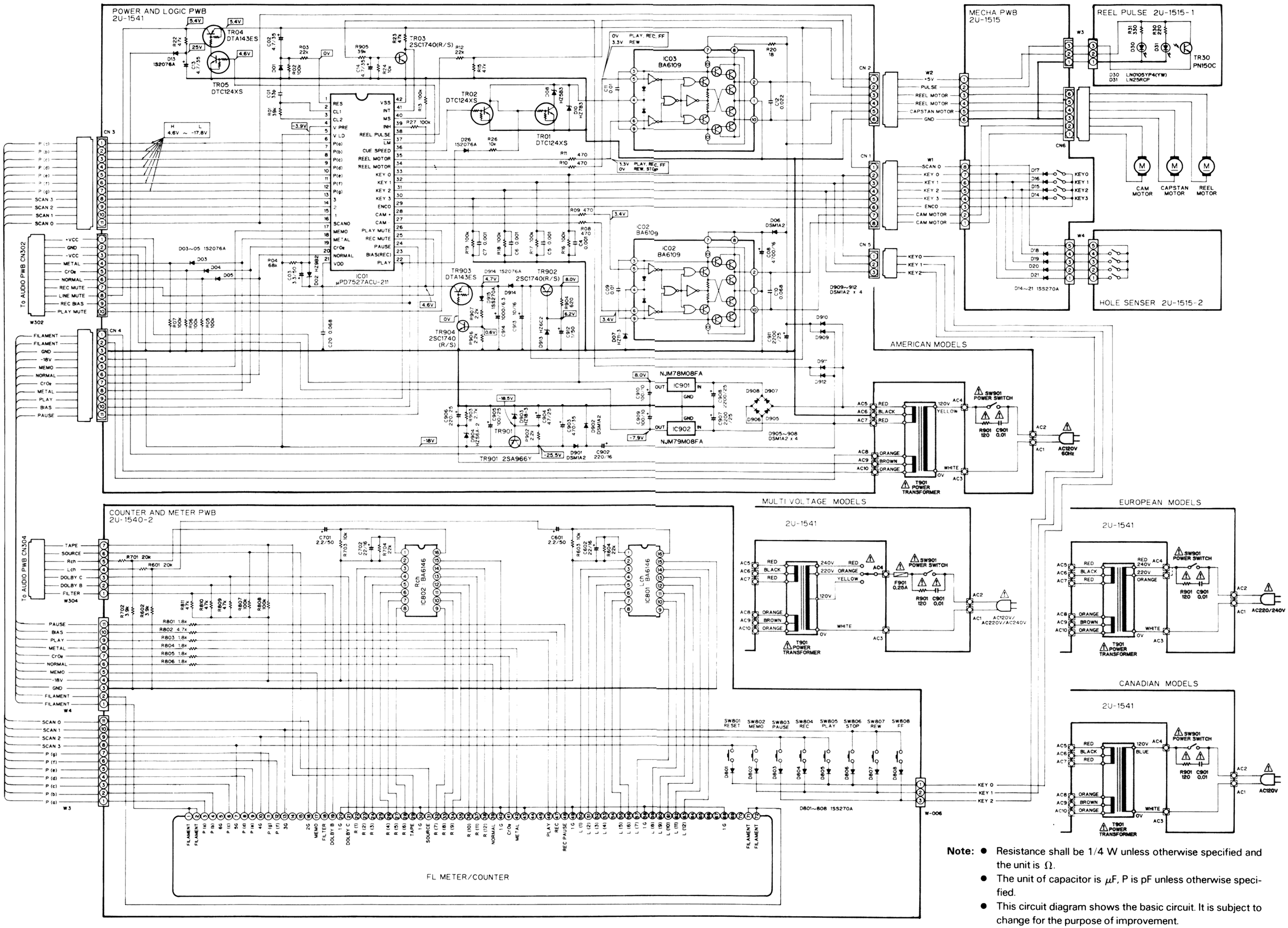


Note:
- Resistance shall be 1/4 W unless otherwise specified and the unit is Ω.
- The unit of capacitor is μF, P is pF unless otherwise specified.
- This circuit diagram shows the basic circuit. It is subject to change for the purpose of improvement.

P.W. BOARD OF 2U-1540 AUDIO AMP UNIT



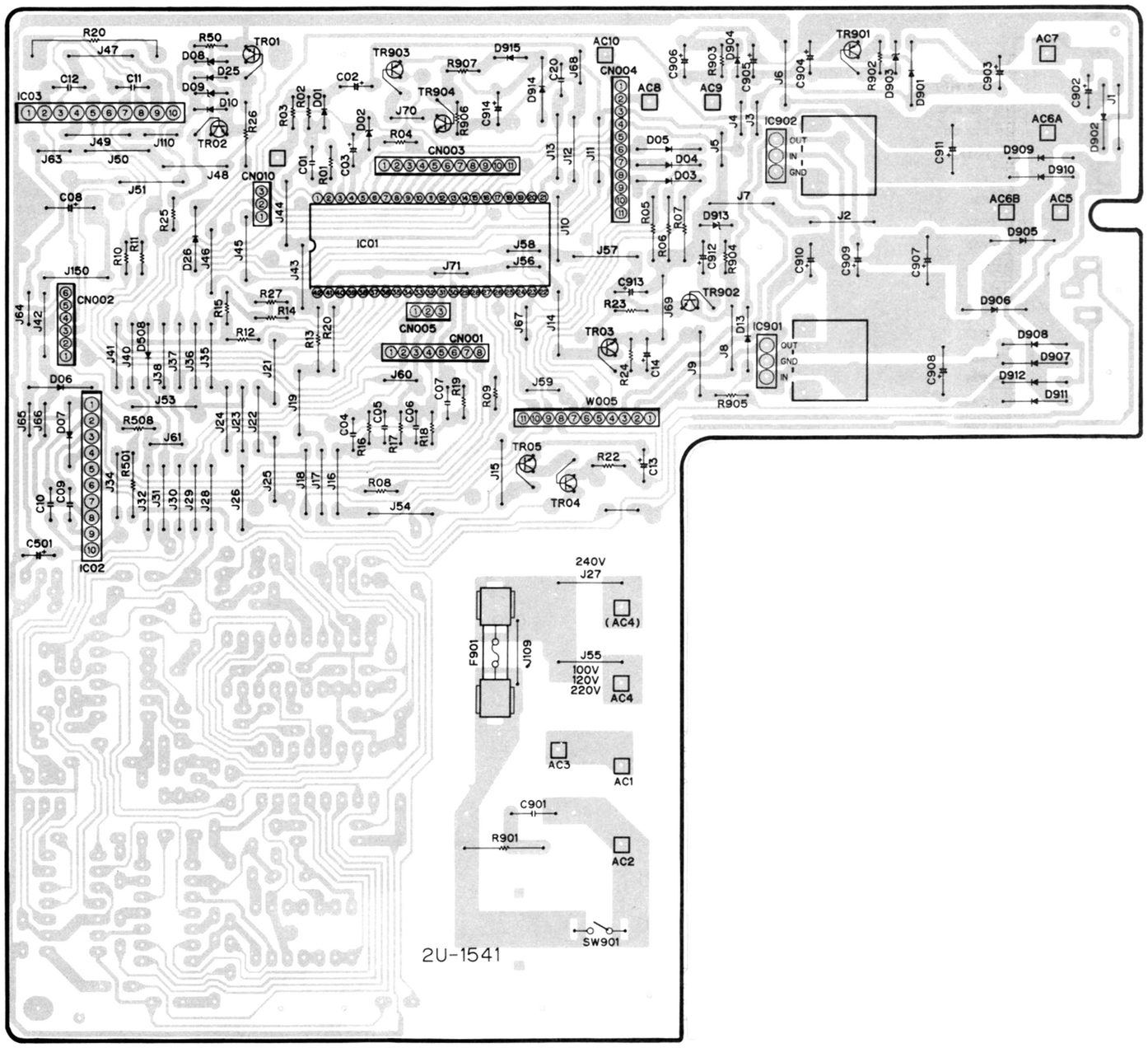
SCHEMATIC DIAGRAM OF POWER/LOGIC UNIT



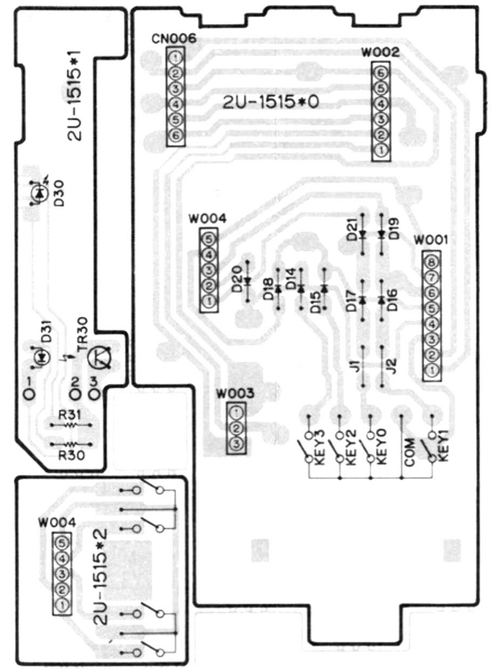
Note:

- Resistance shall be 1/4 W unless otherwise specified and the unit is Ω.
- The unit of capacitor is μF, P is pF unless otherwise specified.
- This circuit diagram shows the basic circuit. It is subject to change for the purpose of improvement.
- Parts marked with ⚠ are of importance in respect to the safety, use the specified type without fail.

P.W. BOARD OF 2U-1541 POWER/LOGIC UNIT

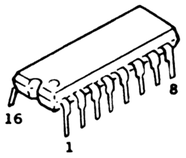


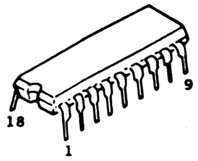
P.W. BOARD OF 2U-1515 MECHANISM UNIT

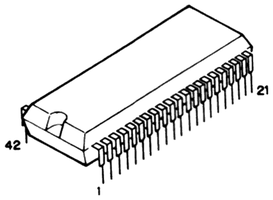


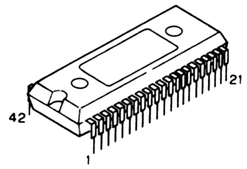
SEMICONDUCTORS

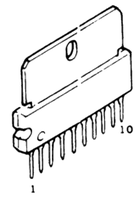
• IC

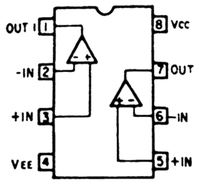












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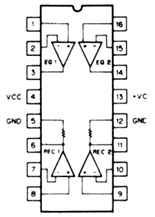
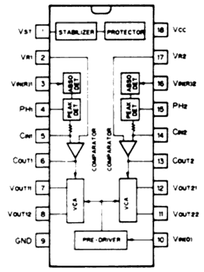
M5220P



μPC1272C



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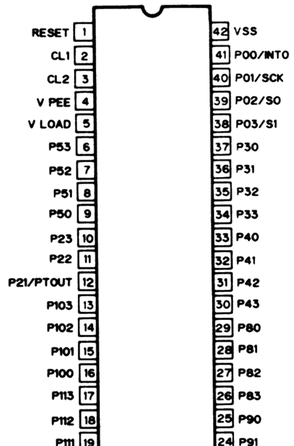

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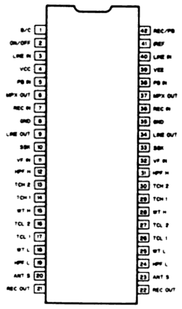

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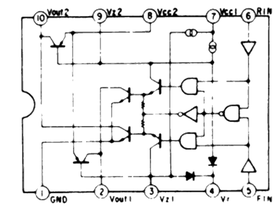

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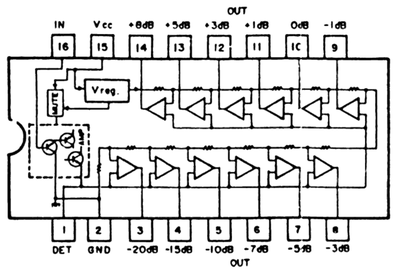

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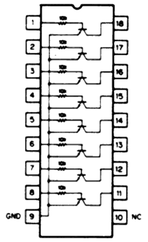

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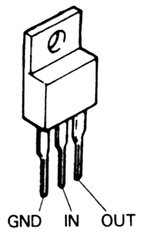

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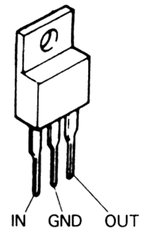

μPC78M08FA

• Transistors

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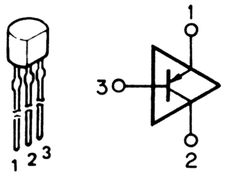
2SD468



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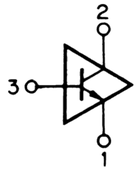
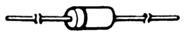


DTC124XS

• Diodes



IS2076A
ISS270A
DSM1A2

HZS5C-3 HZ9B-1
HZS6A-2 HZS9B-2
HZS6C-2 HZS18-3
HZS7B-3

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